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ABSTRACT

This bulletin is published annually in the interest of children with learning disabilities, language disabilities, or dyslexia. The 22 articles discuss the following topics: current issues in dyslexia, language disorders, subgroups in dyslexia, specificity and parameters in defining dyslexia, strategies for recognition and management of reading disorders, defining dyslexia, asymmetries of the brain, sex differences in hemispheric specialization, hemispheric differences and reading strategies, cerebral dominance and subtypes of developmental dyslexia, children's concepts of language in learning to read, assessing reading and language skills, story comprehension and recall in dyslexic students, communication competence in reading and learning, the importance of helping students become avid readers as well as competent readers, implications for diagnosis and treatment of dyslexia, program planning for dyslexic children in the general classroom, intervention for reading achievement for high-risk first grade children, the school principal as advocate for the child with learning differences, supplementary English for specific language disabilities, assisting dyslexic college students, and dyscalculia and dyslexia. (FL)

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An Interdisciplinary Journal of Specific Language Disability

XXIX Current Issues in Dyslexia 1979

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BULLETIN OF THE ORTON SOCIETY

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Foreword

With this issue of our journal, we note three anniversaries of special significance to its readers and the members of the Orton Society. 1979 marks the 30th anniversary of the founding of the Society; the 80th birthday of Margaret Byrd Rawson, past president of the Society, 1971 recipient of the Samuel T. Orton Award, and Editor Emerita of the *Bulletin;* and the 100th anniversary of the birth of the man whom the Society continues to honor through its name and whose seminal work continues to inspire its members, Samuel Torrey Orton, M.D. (1879-1948).

The significance of Dr. Orton's work is brought home to us by Jeanne S. Chall as she reviews in her article the issues in reading that are of current concern—the neurological basis of some reading and language disabilities; the role of language in reading disability; the importance of appropriate instruction; the notion of prevention of reading failure; and the need for the total education of the dyslexic child. Dr. Chall reminds us that on all of these current issues, Dr. Orton long ago had taken a position that, in her words, was far ahead of its time. The Society, formed by Dr. Orton's colleagues shortly after his death in 1948, has continued to labor on all of these issues and to bring them into public view through its conferences and publications.

Although the notion of developmental dyslexia as a form of specific language disability, distinct from other forms of reading retardation, is no longer widely rejected as it was in Orton's time, it definition and etiology are still debated. With contributions from Macdonald Critchley, Drake D. Duane, Jeannette J. Jansky, Richard L. Masland, and Leon Eisenberg, we present a comprehensive review of that debate and bring into focus the issues to be resolved.

Also rejected by many at first was Orton's view of specific language disabilities as neurologically based and possibly of genetic origin. Today, this is an area of serious investigation, and the broad dimension of its study is illustrated by several contributors to this issue—Dirk J. Bakker, Itzhak Fried, Norman Geschwind, and Daniel B. Hier. Dr. Geschwind recalls Dr. Orton's "continued faith throughout his career that study of the nervous system would lead to greater understanding of cerebral dominance and of such disorders as childhood dyslexia." Dr. Geschwind's article gives evidence of the justification for that faith. He presents the findings of recent studies of asymmetries in the brain and discusses the promise they hold both for greater understanding of cerebral dominance and for therapeutic treatment in cases of learning disabilities.

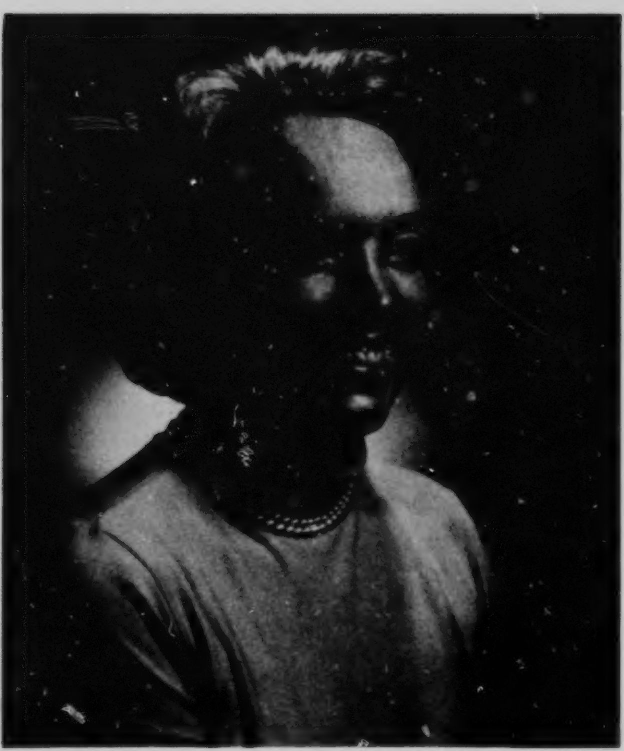
In his 1937 publication, *Reading, Writing and Speech Problems in Children*, Orton described seven syndromes that he had noted among his cases of children with learning disabilities. Today, recent technological advances make possible, with non-invasive techniques, the study of the brain. Thus, with research methods not possible in Orton's time, there is now ongoing investigation of subtypes of dyslexia and the possibility of their relationship to cerebral dominance and hemispheric differences. Articles by Bakker, Fried, and Hier demonstrate the scope of such investigations.

Orton viewed reading and writing as *language* functions and, from that perspective, he considered disabilities in reading and writing as *language disorders*. That view is increasingly shared by others today, and there is now a strong effort to discover the relationship of linguistic and metalinguistic deficits to reading deficits. The effort is exemplified in the contributions to this issue of the *Bulletin* from Tanis H. Bryan, Che Kan Leong, Phyllis A. Weaver and David Dickinson, and from Robert Calfee and his colleagues, Janet Spector and Dorothy Piontkowski.

Beyond his search for an understanding of specific language disabilities, Dr. Orton had great concern for the development of instructional approaches that would enable children to circumvent their handicapping conditions. Today the law of the land mandates identification of and appropriate education for children with learning handicaps, including developmental dyslexia. A number of articles in this issue describe programs developed in both public and private schools and in clinics to meet the specific needs of children, adolescents, and young adults with learning problems. We also include a number of book reviews that demonstrate the extent to which the interest in specific language disabilities has grown since Orton's time.

Margaret B. Rawson shares with us insights and wisdom gained from many years of work with children with specific language disabilities. In her article, "Beyond the Alphabet; From Competent Reader to Avid Reader," she makes clear to us the purpose and importance of our endeavors to understand and treat dyslexia. It is fitting that this article is published in the year in which Mrs. Rawson rounds out the eighth decade of a life dedicated to the education and enrichment of others and in the year in which we observe the 100th anniversary of the birth of one of her sources of inspiration, Samuel Torrey Orton.

—Alice Ansara, Editor



The Samuel T. Orton Award for 1978

Presented by The Orton Society to

Paula Dozier Rome

Presentation by Drake D. Duane

Each year at the annual banquet of the Orton Society, one of the highlights of this function is the bestowing of the highest award which the Society may make—the Samuel T. Orton Award. The selection of the award recipient is made by those who are themselves past recipients of this high honor. Past recipients include June Lyday Orton,* Dr. Lauretta

Bender, Dr. Macdonald Critchley, Dr. Edwin Cole, Dr. Lloyd Thompson,* Dr. Richard Masland, Katrina de Hirsch, Sally Childs, Margaret Rawson, Beth Slingerland, Roger Saunders and Aylett Cox.

This year's recipient of the Samuel T. Orton Award was born in San Francisco and, as a young adult, went to Los Angeles where she began her undergraduate studies at the University of California. From there she went to the East, where she had family roots, and completed her undergraduate training at the University of Pennsylvania. There she received a baccalaureate with distinction and was elected to Phi Beta Kappa. Although initially she had been interested in pre-medical studies, she had later decided upon educational psychology and it was in this field that she took her degree.

Her links to the Orton Society, like developmental dyslexia itself, had a genetic component, for it was in Philadelphia that she worked with her uncle, Dr. Paul Dozier, at the Institute for Neurological and Psychiatric Diseases. Her work with Dr. Dozier allowed her to share his appreciation of Dr. Orton's work, an appreciation based upon his earlier collaboration with Dr. Orton in New York City.

In 1941, she married and up-and-coming young psychiatrist who was to prove not only a good judge of character in a spouse, but also was to become one of the most eminent psychiatrists of the mid-20th century. She, her husband, and their growing family, which was eventually to include five children, moved to Washington, D.C., in 1943. In that city and in that year, they had the privilege of providing a Christmas repast for a then struggling and lonely student of architectural design, Buckminster Fuller. At that dinner, they learned of the new science of geodesics.

In the mid-1940's they left the ivy of the eastern seaboard to find shade in the fertile valleys of southeastern Minnesota. Dr. Benjamin Spock, then a pediatrician at the Mayo Clinic, noted her gift for teaching and sought her advice in the assessment of youngsters who seemed to have unusual difficulty in the acquisition of language skills. What then began as a periodic consultation for the children of family friends has since grown into an important and flourishing training service center in the upper Midwest of the United States. The impact of that program has spread throughout the United States, and now that work has been modified and translated into Spanish so that it may be shared with our Latin American neighbors.

Her activity within a newly expanding Orton Society was initiated by "supersleuth" Margaret Rawson. From the membership list of the Society and a letter of reference about our recipient's teaching activities, Mrs. Rawson correctly deduced that she was indeed the niece of Dr. Dozier and extended an invitation to her to participate in the Annual Conference and submit material for publication in the *Bulletin* of which Margaret was then editor. This was indeed a great "find."

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*Deceased

Without the efforts of our Award recipient, there might never have been the successful 25th Silver Anniversary meeting of the Orton Society in Rochester, Minnesota. And had it not been for her stimulating influence and winning charm many individuals—Jean Osman, Mary Lee Enfield, Wilson Anderson, Marcia Henry, Dorothy Ley, and myself, to name only a few—would not now be active participants in this organization. Because of her efforts, a great private college in this state is now developing a college level program for talented dyslexic students. She has influenced dozens of physicians, hundreds of teachers, and directly and indirectly thousands of children in the field of developmental dyslexia. In the course of my reviewing charts of children assessed at the Mayo Clinic, it has not been unusual to see a reference to her with the recommendation that the best placement for the child would be in her reading center.

Her interests, combined with that of her husband, have taken them all over the world, and they have had the privilege of knowing well such outstanding scientists in the field of brain and language research as Dr. Critchley and Dr. Luria. Her work, always carried out with modesty and grace, has now been shared with the psychiatric community in the United States and Canada through her influence in the production of an issue of *Psychiatric Annals* devoted to the topic of developmental dyslexia. It will now spread to the work of our colleagues in pediatrics in a forthcoming issue of *Pediatric Annals*.

She helped to train my wife in the basics of a structured yet sensitive approach to the language-handicapped child, provided remedial services for my own children, and she charmed me into becoming an active participant in the work of the Society. Charm, grace, poise, skill, deliberation, and sensitivity only begin to describe this truly wonderful woman who has served so many so well.

The Orton Society takes pleasure in presenting its **1978 Samuel T. Orton Award to Paula Dozier Rome.**

> Sensitive and thorough, teacher and friend to students, teachers and physicians, her contributions to the Society have spread from a small Midwestern town to the distant corners of

the globe. Her work has enlightened many as to the means by which one may help to unburden the student perplexed by written language.

For her contributions, this award is presented to Mrs. Rome at the 29th Annual Meeting of the Orton Society, November 3, 1978, Minneapolis, Minnesota.

Response
by Paula Dozier Rome

I am deeply honored by your making me the recipient of the 1978 Samuel T. Orton Award. I thank you and I accept it with pride.

It is an honor that means more to me than any other for, of my 60 years, 40 have been involved in the field of language disabilities. This award means that one walks in the footsteps of many greats, and it is very humbling to be its recipient.

This is a year of many anniversaries. It is:

forty years since I first met Dr. and Mrs. Orton;

forty years since I first met Anna Gillingham;

forty years since I started my training in this field at the Institute of the Pennsylvania Hospital, under the aegis of my uncle, Dr. Paul Dozier, who was a neurologist and a psychiatrist. He had trained under Dr. Orton in New York and he headed the language clinic at the Pennsylvania Hospital. (The clinic had been funded through a Rockefeller grant.) It was there that I learned the diagnostic procedures and teaching techniques—the Orton-Gillingham Approach—that I use to this day and which I feel have stood the test of time.

And it is *forty years* since I taught John Christian, my first student. He was the "bait," as it were, upon which I was "hooked," and have remained "hooked" ever since. John and I spent two years together, working and learning from each other. The blossoming of this twelve-year old boy, as he progressed and gained the needed tools to read and spell, showed me how life could be changed socially, educationally, and emotionally.

I thank my family for their patience, understanding, and support when I was not always a full-time wife and mother.

My thanks go to my dear friend and associate of twenty years, Jean Osman.

And last, but not least, I thank all of you—my friends, my mentors, especially Margaret Rawson, and my colleagues and students—who have added continued depth to my knowledge and broadened my perspectives.

Thank you again.

On Reading: Some Thoughts on the Old and the New

Jeanne S. Chall

Harvard University

It is a pleasure and a great honor to be able to address the members of the Orton Society at its Annual Banquet.[1] It is an opportunity to look forward, first by looking back to the Society's beginnings and to its early views on reading and reading disability, and then to how these views are generally held today.[2]

It is especially fitting to take a backward glance when the Society is approaching the 30th anniversary of its founding. It is also fitting to do so at a time of great change in the reading achievement and needs of the American people. In a real sense, our time can be characterized as the time of the second literacy revolution. The first occurred less than one hundred years ago, when the goal of bringing most people to a level of functional literacy—a level typical for fourth graders—was achieved. The second revolution seeks a higher level of literacy—a level achieved by the typical student at the completion of high school—one that was achieved by only the most privileged a generation or two ago. In 1940, it was estimated that the average adult could read on about an eighth-grade level. Now the average is estimated to be at about an eleventh- or twelfth-grade level. And, since soon half of all young people of college age will be attending college, the level will be higher.

The levels of reading achievement needed are also rising despite the current interest in simplifying government forms into plain language. For example, the cook's manual—the simplest army manual according to Tom Sticht (1971, 1972)—is written on an eighth-grade level, but most navy technical manuals require about an eleventh- or twelfth-grade reading level. Thus, in spite of the predictions of some observers that the electronic media would replace the printed word, particularly among poor readers, it does not seem that reading and writing are about to become obsolete. In fact, reading and writing seem to be even more essential for work, for leisure, and for full citizenship in the Jeffersonian sense. Those who do not come up to minimal levels, at the very least, will suffer.

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[1] Banquet address at the 29th Annual Conference of The Orton Society, Minneapolis, Minnesota, November 1978.

[2] I wish to thank Alice Ansara for making her collection of old issues of the *Bulletin of The Orton Society* available to me and for her warm and sympathetic reactions.

Issues Past and Current

What, then are the issues? From its very beginning, the Orton Society was aware of the difficulties and of the special instruction needed by those with problems in reading and language. What were some of the issues recognized by the Society and on which the Society labored during its first three decades?

Neurological Basis of Reading and Language Disabilities

First and foremost has been Orton's position on the neurological basis of at least some reading and language disabilities—a position far ahead of its time.

Earlier Views. The prevailing scenario of the 1950's and early 1960's went something like this: If there is a reading disability, look first to IQ. If IQ is normal, look to emotional problems. If emotions are not the problem, look to a "pushy" mother. This scenario, admittedly oversimplified, was played out regularly over a period of nearly two decades, and it seemed to be followed in countless schools and clinics in spite of the multicausal position taken in most textbooks on diagnosis and treatment of reading disabilities. Generally, the possibility of a neurological cause was given so low a probability that it was almost non-existent in the reality of the prevailing practice.

Support for probable neurological causes was still a relatively uncommon position in the early 1960's. Yet, the 1960 *Bulletin of the Orton Society* carried a brief report on the Pre-Conference Institute held in New York City on "Neurological and Psychiatric Considerations in Reading Retardation." Ralph D. Rabinovitch, M.D., of the Hawthorne Center, was the main speaker and the Institute was sponsored by the International Reading Association for clinical directors and researchers.

The *Bulletin* reported Dr. Rabinovitch's three-part classification of children with reading disability: (1) emotional—capacity is intact but impaired by negative external influences; (2) brain-injured—capacity to learn is impaired by frank brain damage manifested by clear-cut neurological deficits; and (3) "true" reading disability—capacity to learn to read is impaired without definite brain damage suggested in history or on neurologic examination. Quoting directly from Rabinovitch, in bold type, the *Bulletin* continues:

> [the] defect is in the ability to deal with letters and words as symbols, with resultant diminished ability to integrate the meaningfulness of written material. The problem appears to reflect a basic disturbed pattern of neurologic organization. Because the cause is biologic or endogenous, these cases are diagnosed as primary retardation.

The *Bulletin's* reporter adds the comment that "Dr. Rabinovitch's description of the latter group ['true' reading disability] corresponded closely to the specific, developmental reading disability cases delineated by Dr. Orton and very familiar to members of the Orton Society, Inc." (p. 31).

Orton Society members who attended the Institute were also reported. They included Mrs. Cecily C. Battinson, Mrs. Katrina de Hirsch, Dr. Elizabeth M. Junken, Mrs. Samuel T. Orton, Mrs. Mildred B. Plunkett, and Mrs. Florence Roswell. At the risk of seeming immodest, I must add that I, too, was present as Chairman (not chairperson—the term had not yet been invented) of that first pre-conference institute of the International Reading Association.[3]

Current Views. Where is the neurological issue now? It has recently become the "law of the land" with the definition of learning disability under Public Law 94-142. In Massachusetts, through Chapter 766, it has been the law of the Commonwealth for more than five years. Furthermore, from a research and scholarly standpoint, it has gained wide interest. The NSSE Yearbook *Education and the Brain* (Chall and Mirsky 1978), the first publication designed specifically to bring the recent findings from the neurosciences to educators, indicates the interest in neurological factors among educational researchers, administrators, and teachers.[4]

The Future. What of the next 30 years? One of the many problems calling for attention is a seeming inequity in classifying children with neurologically based disabilities. Is it true, as some say, that dyslexia is a middle-class disease? Is it true that few children of low socio-economic background are diagnosed as dyslexic? This can occur because the definition of learning disability in the federal and state laws excludes children with inadequate home stimulation. It may also stem from the tendency to place children in only one handicapping category although they may have more. Thus, a child can have, according to the legal guidelines, a learning disability or an emotional problem or eligibility for a Title I or bi-lingual program; or a child can be mentally retarded or physically handicapped or gifted. Yet, it is quite possible to be bi-lingual, poor and therefore eligible for Title I, as well as gifted *and* dyslexic.

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[3] Among those on the pre-conference institute committee were Anne McKillop of Teachers College, Columbia, and Florence Roswell then of City College. Also attending as a participant was N. Dale Bryant of Teachers College, later to serve as a president of The Orton Society.

[4] See *Bulletin of the Orton Society*, vol. 28, pp. 233–242, for an extensive review of this volume by Richard Masland.

In the *APA Monitor* for December, 1978, Garry McDaniels, psychologist and director of the Division of Innovation and Development in the Bureau of the Handicapped, Office of Education, noted that P.L. 94–142—the Education for all Handicapped Children Act—"may go so far as to restrict sound diagnosis by pigeon-holing children into one of eleven learning-disabled categories" (p. 1).

It may be that children whose parents are not affluent have a lower probability of being classified as learning-disabled because a greater effort is needed to bring about such a diagnosis. More specialists are needed to test the child, specialists not readily available in schools with limited resources. Also, more monitoring is needed by parents and it is the educated parents who are usually better at this or, if not, they can afford to seek out the counsel of advocates and attorneys. Greater equity in classification of children with neurologically based disabilities is called for.

The Role of Language in Reading Disability

A second issue is that of understanding the role of language in reading disability and its treatment. Here, too, the Orton Society has pioneered. Katrina de Hirsch expressed this eloquently at a meeting reported in the 1952 *Bulletin*.

> I think most of us. . .deplore the division between two groups, one group being exclusively concerned with speech defects, and the other with reading disabilities. We adhere to Dr. Orton's concepts which prove that in developmental disorders in language, much as in aphasia, several aspects of symbolic functioning may be disturbed (p. 5).

Current Views. The inter-relatedness of the various language abilities has now become central in the theories and research of psychologists, reading specialists, and researchers in language acquisition. John B. Carroll, the noted psycholinguist, writes in a recent chapter on psycholinguistic contributions to reading:

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> . . .reading has to be seen, not as a unitary process of meaning, but as a complex set of inter-related competencies involving language in both written and spoken form (1978, p. 23).

Some reading theorists go even further on the central place of language, proposing that the visual-perceptual and phonic aspects of reading play a very minor role, if at all, in the acquisition of reading (Goodman and Goodman 1977; F. Smith 1977). At the risk of oversimplifying their views, it seems that they are saying that not only is the teaching of decoding (phonics) not necessary for learning to read, but that it may impede it by drawing the child's attention away from the meaning in the language— the major task of reading.

In recent clinical research, reading difficulties heretofore seen as resulting from visual-perceptual deficits are being explained by linguistic deficiencies (Vellutino 1977).

The Future. Where do we go from here in the next 30 years? Are we preparing ourselves for a return to the natural, sight, and meaning methods that were abandoned less than a decade ago because they were found wanting? This would be unfortunate, for the research evidence is still stronger for a code-emphasis in beginning reading for most children (Chall 1967). Indeed, the most recent evidence for the advantage of a code emphasis comes from the latest National Assessment on Reading that found children in grades one to four to be achieving better in reading than children in those grades did five or ten years ago when the beginning emphasis was on meaning.

Why the desire to return to meaning emphasis methods? One reason is, I think, the concern with poor achievement in the intermediate and upper grades. Since the intermediate grades are concerned with comprehension, it is being argued (as it was in the 1920's and 1930's), reading instruction, therefore, should stress language and meaning from the start.

What I think we should do during the next 30 years, if we are to avoid going around in circles and undoing the good we have accomplished, is to view reading acquisition developmentally. If we do, I think we will find that is is not a matter of stressing meaning or decoding across the board for all children at all levels, but that at different levels or stages in the reader's development there is a need for different emphases (Chall in press).

The Role of the Teacher

The teacher makes the difference. Here, too, the Orton Society was ahead of its time. Can there be a better expression of the importance of teachers than in Orton's Credo, published on the back cover of the *Bulletin* for the first ten years of its existence?

> The view here presented that many of the delays and defects in development of language function may arise from a deviation in the process of establishing unilateral brain superiority in individual areas, while taking account of the hereditary facts, brings with it the conviction that such disorders should respond to specific training if we become sufficiently keen in our diagnosis and if we prove ourselves clever enough to devise proper training methods to meet the needs of each particular case.

What greater respect for teachers than to challenge their need to be clever, and to offer them collaboration?

The past decade has brought several studies confirming the importance of the teacher. In one, based on close observations of first-grade classrooms, teachers who were rated as excellent, who provided instruction at an appropriate level of difficulty, who used a code-emphasis approach, and who emphasized thinking, produced significantly higher reading achievement in their pupils (Chall and Feldmann 1966).

Jansky and de Hirsch (1972) found that teachers judged by their principals to be adequate had fewer failures among their high risk children—about one-half fewer—than those teachers judged to be inadequate.

Dr. Martha Bridge Denckla (1978) discusses "people power" and "teacher power" as essential conditions in the treatment of children with minimal brain dysfunction or learning disabilities.

Where do we go in the next 30 years? Continued work will be needed on high qualifications of teachers, on their professional skills, and on continued collaboration among associations doing similar or related work.

Prevention of Reading Disability

In the notion of prevention as well as treatment, the Orton Society also was in advance of others. At least three kinds of prevention have been its concern. First is prevention through use of those classroom methods that are effective for all, yet least harmful to those at high risk. This kind of prevention was implied by Orton (1937) when more than 40 years ago, he wrote:

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> There has been in recent years a swing toward the use of the sight and flash-card method of teaching reading and away from the use of phonetics (i.e. phonics). The writer is not in a position to offer an opinion as to the efficacy of either of these methods as a general school procedure, but their effect on children suffering from varying degrees of strephosymbolia has come under his immediate attention and he feels there can be no doubt that the use of the popular flash method of teaching reading is a definite obstacle to children who suffer from any measure of this disability. . . . (p. 175.)

The second kind of prevention, also of long interest to the Society, is prevention through early screening and treatment. (See de Hirsch and Jansky 1966.)

A third procedure for preventing failure of high risk children attempts to classify them, according to the approach by which they learn best, and matches a method to their preferred style of learning—aptitude/method interaction.

Where are we now? In the last ten years, the hopes of Orton for a change in classroom methods for beginners has been realized. Recent analyses of basal readers and teachers' guidebooks indicate measurable changes toward a code emphasis; that is, the published reading programs teach beginners more phonics and they teach it earlier in comparison with those published in the 1950's and 1960's (Chall 1967; Popp 1975; Chall 1977a; Chall in press). Achievement scores have also gone up for grades one through four for children taught by these programs.

There has also been wide acceptance of early screening and remediation. There are more predictive tests for the purpose, and many of the ideas about early prediction have been incorporated into government-sponsored early childhood programs.

There have been periods of great hope about the possibility of matching methods to individual strengths and weaknesses, i.e., to individual "learning styles"—but the research results have not been very encouraging. Recent attempts, however, based not on global diagnostic labels, but on individual educational testing and matching the results to method, do hold promise (Popp 1978).

Prevention in the future. What about prevention in the next 30 years? I think we will continue to improve classroom methods for high risk children, as well as for those making normal progress, by defining methods more broadly to include the effects of the teacher, classroom organization, and such factors as time-on-task (Chall 1977b). The influence of the home will also be taken into account in prediction and prevention.

We need to take a look at the alleged negative effects of early labeling and treatment about which fears increasingly are expressed by reading and learning disabilities specialists. Does this fear stem from the current preference for mainstreaming handicapped children? This issue needs to be studied for, if true, the gains children make from early treatment can be dissipated.

I think the time may have come again for the aptitude/methods interaction studies and experiments, particularly with the recent interest in differences in styles of learning by different hemispheric preferences. The educational tests and treatments of Popp (1978) show much promise.

The Need for Education of the Dyslexic Child

The Orton Society pioneered in calling for the total education of the child while remedial help was given. Yet not very much has been done systematically on the general education of dyslexics. It would seem that the major instruction offered is in reading and related language skills. What about the child's need for studying literature, science, social studies, mathematics, art and music?

Is it possible to teach the regular curriculum at the student's intellectual level, but on the lower reading level of the dyslexic child? Adjustments can be made in the reading curriculum but can they be made in the content areas? And should they be made? Is it possible to find textbooks or to write them on the dyslexic's mental level as well as on his reduced reading level? Or must the content work be done with TV, films, filmstrips, tapes, and other non-print media?

Educating the dyslexic child on a level commensurate with his cognitive ability is essential not only for his general education but for the full development of his reading ability. For beyond the primary grades, proper growth in reading can be achieved only with sufficient knowledge and with sufficient language development. After the bare beginnings in reading, one needs to be educated in order to read and understand, just as one needs to read in order to be educated. Concern for the dyslexic's reading achievement means concern for his total education.

There is much for us to do on this issue during the next 30 years for more dyslexics are completing high school and many are going on to college and graduate school.

Dyslexia and Minimum Competency

The last issue concerns minimum competency—how much reading achievement is adequte for high school graduation. Should we expect dyslexics to reach the same levels as non-dyslexics of the same chronological age, grade placement, and mental ability?

We really do not seem to have much data on this. We have too few follow-up studies designed to test long-term effects of remediation, such as that of Margaret Rawson (1978). A recent analysis of the published controlled studies of the effects of remedial reading shows that remedial reading significantly improves reading achievement in both the short and long term (L. C. Smith 1978).

In a recent survey of the fifty Chief State School Officers, we found all but four of the states concerned with developing minimum competency tests or planning to do so (Chall 1978). Only two states reported the minimal reading achievement required for high school graduates and both placed that at ninth-grade level. New York state, however, has recently reported that it will raise its minimum competency standard to tenth grade by the early 1980's.

Even though children with learning disabilities will be exempted from the tests, can we sit back? Will this mean a different, less acceptable diploma for them?

The work to be done on this issue in the next 30 years is great. We will need to study the problems and successes of younger and older dyslexics with a view to determining the rate of progress that is to be expected under certain conditions and at certain times. It would seem that if dyslexic children are to become independent adults, they too will have to reach higher levels of literacy required in a world growing ever more complex and demanding.

Conclusion

I have presented some of the problems on which the Orton Society has labored during the past three decades and some of the issues needing battle in the next three.

Much has happened in the past 30 years. Many of the dreams of Orton and of the Society have been realized. But I do not think anyone will wish to rest for long, for the victories have brought new problems. And so, to borrow a few words from Dr. Samuel Torrey Orton: if we continue to be "sufficiently keen" and prove ourselves "clever enough," it would seem that the labors of our next 30 years may be as fruitful, and even more so, than those of our first thirty.

References

Carroll J. B. 1978. Psycholinguistics and the study and teaching of reading. *In* S. Pflaum-Connor (ed.). *Aspects of Reading Education.* Berkeley, California: McCutchan Publishing Corp.

Chall, J. S. 1967. *Learning to Read: The Great Debate.* New York: McGraw-Hill.

Chall, J. S. 1977a. *Reading 1967–1977: A Decade of Change and Promise.* Bloomington, Indiana: Phi Delta Kappa.

Chall, J. S. 1977b. Implications of the neurosciences for education. *In* K. E. Hansen (ed.). *Beyond the School: What Else Educates?* A Report of the Chief State School Officers 1977 Summer Institute, USOE, with the Council of Chief State School Officers and the Michigan Department of Education, Bellaire, Michigan, July 28–August 5, 1977.

Chall, J. S. 1978. Minimum competency testing. *Harvard Graduate School of Educ. Assoc. Bull.* 22(3):9–11.

Chall, J. S. In press. The great debate: ten years later, with a modest proposal for reading stages. *In* L. B. Resnick and P. A. Weaver (eds.). *Theory and Practice of Early Reading.* Hillsdale, New Jersey: Lawrence Erlbaum.

Chall, J. S. and Mirsky, A. F. (eds.). 1978. *Education and the Brain.* Seventy-seventh Yearbook of the National Society for the Study of Education, Part II. Chicago: U. of Chicago Press.

Chall, J. S. and Feldmann, S. C. 1966. *A Study in Depth of First Grade Reading: An Analysis of the Interactions of Proposed Methods, Teacher Implementation and Child Background.* Cooperative Research Project No. 2728. Washington, D.C.: U.S. Office of Education.

de Hirsch, K., Jansky, J. J. and Langford, W. S. 1966. *Predicting Reading Failure.* New York: Harper and Row.

Denckla, M. B. 1978. Minimal brain dysfunction. *In* J. S. Chall and A. F. Mirsky (eds.). *Education and the Brain.* Chicago: U. of Chicago Press.

Goodman, K. and Goodman, Y. 1977. Learning about psycholinguistic processes by analyzing oral reading. *Harvard Educ. Rev.* 47(3):317–333.

Jansky, J. J. and de Hirsch, K. 1972. *Preventing Reading Failure.* New York: Harper and Row.

McDaniels, G. 1978. *Cited in* Donald Foltz. ETS conference looks at testing's impact on education policy. *APA Monitor* 9(12):1.

Orton, S. T. 1937. *Reading, Writing and Speech Problems in Children.* New York: W. W. Norton.

Popp, H. M. 1975. Current practices in the teaching of beginning reading. *In* J. B. Carroll and J. S. Chall (eds.). *Toward A Literate Society.* New York: McGraw-Hill.

Popp, H. M. 1978. Selecting initial reading instruction for high-risk children: a theoretical approach. *Bull. of the Orton Society* 28:15–42.

Rawson, M. B. 1978. *Developmental Language Disability: Adult Accomplishments of Dyslexic Boys.* Cambridge, Massachusetts: Educators Publishing Service.

Smith, F. 1977. Making sense of reading—and of reading instruction. *Harvard Educ. Rev.* 47(3):386–395.

Smith, L. C. 1978. *An Evaluation of Studies of Long Term Effects of Remedial Reading Programs.* Unpublished thesis. Harvard University, Graduate School of Education.

Sticht, T. G., Caylor, J. S. and Kern, R. P. 1971. Project REALISTIC: evaluation and modification of REAding, LIStening and arithmeTIC needs in military jobs having civilian counterparts. *HumRRO Professional Paper 19–71.* Alexandria, Virginia: Human Resources Research Organization.

Sticht, T. G., Caylor, J. S., Kern, R. P. and Fox, L. C. 1972. Project REALISTIC: determination of adult functional literacy skills levels. *Reading Research Qtly.* 7(3):424–465.

Vellutino, F. R. 1977. Alternative conceptualizations of dyslexia: evidence in support of a verbal-deficit hypothesis. *Harvard Educ. Rev.* 47(3):334–354.

ISSUES OF DEFINITION

A Brief Historical Overview of Language Disorders

Macdonald Critchley, C.B.E., M.D., F.R.C.P.

Consulting Physician, The National Hospital
London
Consulting Neurologist, King's College Hospital
London

Two centuries ago, it eventually dawned upon the philosophers of medicine first that language was exclusive to the human race and, secondly, that it had something to do with the brain.

Then gradually there came the realization that physicians were witnessing the product of disease (when confronted by adults who through illness or war wounds had lost the ability to talk or to comprehend fully what others were saying) not of the tongue or of the voice-box in the larynx, but of the brain. Furthermore, it was damage to only certain areas of the brain which led to impaired speech, and these regions were in the front part of the head rather than the back. Moreover, only one half of the cerebrum was vulnerable. Slowly, there came about a three-fold tie-up among the notions of handedness, of one-sided cerebral dominance, and of a presumed "speech center" within the major hemisphere. Even now, many aspects of this doctrine and its relationship to "aphasia," as we call it, are not fully understood; indeed, some are topics of fierce controversy.

Those who study the patterns of speech disintegration realize that no two aphasic patients are identical. They are also well aware that some aphasiacs can express themselves vocally well enough, but have completely lost their former skill of reading. A few of these can write but cannot read back their own script; more can neither read nor write. When such cases first met the astonished gaze of the medical profession over a century ago, the doctors spoke of "word-blindness" while others, like the ancients, spoke Greek and referred to "alexia" or "dyslexia."

Pari passu with these aphasiological wonders, other kindred matters were being pondered. I have said that language is a human perquisite. Not

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These remarks by Dr. Critchley opened the Pre-conference Symposium of the 29th Annual Conference of The Orton Society in Minneapolis, Minnesota, November 1978.

only is it exclusive to *Homo sapiens*, but somewhere along the line of human development it must have crossed that rubicon which separates cries and calls of the highest anthropoids from our earliest and crudest ancestors. How many millions of years ago this event took place we do not know and maybe never will know. Nor can we do more than make a rash surmise as to the nature of that most lifeless of "dead" languages. Linguists of today are simply bored when asked such questions, and these are matters that are deliberately swept under the rich carpets of our academies of science.

But the geographers of language are not silent. They tell us that just as nowhere in existence is there any subhominoid animal species—however sagacious—that is endowed with the faculty of language, so is there no human community—and never has been—that does not possess the power of speech. However crude, even bestial, their way of living, their tongues at any rate are anything but primitive. The lowliest "savage" employs a grammar more intricate than Greek, a vocabulary richer than Arabic, and an elaboration surpassing Japanese or French. What then is missing? They have no literature. Hundreds of millions living today are illiterate.

The idea, then, that somewhere at some time there existed a missing link, a *Homo alleles*, is but a myth. I can go further, and say that man, literate or illiterate, is, if anything, too voluble. Verbosity goes with gregariousness; the simpler the community, the greater the quantity of talk and the poorer its quality. "Phatic communion" is the term for this mindless chatter. It is a sad symptom of social living, of communal existence. As Endore put it, "Man is determined to express himself. . . .He must utter, for what is inside must come out. Out of the mouth if possible, but in any case, out. . . .All over the world and throughout history, man speaks. On his deathbed, muttering and stuttering, he still seeks to utter. And the suicide always leaves a note."

Listen, too, to Dean Swift:

> "The common fluency of speech in many men and most women is owing to the scarcity of matter and scarcity of words; for whoever is a master of language and hath a mind full of ideas will be apt in speaking to hesitate upon the choice of both; whereas common speakers have only one set of ideas and one set of words to clothe them in; and they are always ready at the mouth. So people come faster out of a church when it is almost empty, than when a crowd is at the door.

If then we can speak of the mystery of the origins of human language, we can also go on to discuss that awesome magic that surrounds the acquisition of spoken speech in the child. Why is it that in normal circumstances the infant instinctively cries, gurgles, chortles, babbles, and eventually learns baby-talk and then, later, mature speech? Three conditions must be present for this miracle to come about. The tiny child must possess its rightful perceptual equipment, its rightful mental potential, and, thirdly, companionship—for no infant will ever learn to talk if reared in solitude or in a wild-life community like the fabled wolf-children.

But these three requirements are not enough to explain the fact of how it is that the child—without benefit of formal instruction, without grammars, dictionaries or talking machines—will, with unparalleled speed, attain a maturity of speech, correct in syntax, prosody, and pronunciation, in a way that will never again be possible later in life, even with all the advantages of language laboratories. This is the miracle of speech that still astounds us. If one day we were to find the solution of this mystery, we might be in a position to help materially those learning-disordered children to whom we are dedicated.

Certain items of language pathology are familiar to us. We know that nervous control over the organs of articulation is sometimes delayed for reasons we only dimly understand. We know that excessive propinquity is sometimes deleterious, as in the secret languages of identical twins. We know that factors of sex and of environmental circumstances may operate one way or another. We know that sometimes there are strange entities at work, which we speak of as congenital auditory imperception, congenital language disability, and congenital retardation in the acquisition of speech. Sometimes we mistakenly refer to congenital "aphasia" for want of a logical and scientific and less faulty term.

George Miller, the linguist, has summarized these variables and has come up with a formula for an ideal speech development. He has visualized the most precocious child orator in a blind girl, the only daughter of wealthy parents. The most handicapped child, on the other hand, would be a boy, hard of hearing, one of a pair of twins, born into a large family, with poor parents who speak not only one language, but two if not more.

We have been a long time coming to the proper topic of this paper, namely, delay in learning to read—understandably so, in a way, for the acquisition of writing and reading came about very late indeed in the history of the human race. The story of the discovery of an inherent, constitutionally determined delay in the mastery of written language has been discussed by me many times and is familiar to members of the Orton Society and readers of its *Bulletin*. I would prefer, therefore, simply to name and pay tribute to the four great pioneers in our discipline: that sickly ophthalmic physician of Glasgow, James Hinshelwood (1859-1919); the shrewd North Irishman and versatile practitioner, Pringle Morgan (1863-1934); the sagacious Scottish school doctor at an industrial city in the North of England, James Kerr (1862-1941); and, finally, our own incomparable Samuel T. Orton (1879-1948) whose centenary we will soon commemorate.

As we carry on the work begun by these pioneers, let us take heart in what Dr. Angell said in his inaugural address at Yale:

> Not all my class attends my lectures. Of those who attend, only half listen to what I way. Of those who attend and listen, only half understand. Of those who attend and listen and understand, only half remember. Of those who attend and listen and understand and remember, only half agree. The damage, therefore, is not serious.

Subgroups in Dyslexia: Issues of Definition

Richard L. Masland, M. D.

Professor Emeritus of Neurology
Columbia University
New York City

The Committee on Dyslexia and World Illiteracy of the World Federation of Neurology has defined dyslexia as "A disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence and sociocultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin."

More recently, Duane (1977) has offered the following: "A constitutional and often genetically determined disparate reduction in the rate and quality of the acquisition of written language skills, which may or may not be associated with other problems of symbolic manipulation and disordered development of concepts of time and space (both personal and extrapersonal)."

Both of these definitions postulate that there is a group of individuals who differ in some qualitative way from the majority in respect to their inability to learn to read. This thesis has been questioned, and there are many who hold that there is a continuum of reading ability—from those who read easily to those who read with difficulty. The level of reading ability would simply represent the random interaction of diverse factors, and those we call "dyslexic" would represent the lower end of a "normal" distribution curve. In such a random distribution situation, the number of those at the lower end of the scale should balance the number at the higher end.

When the curve is asymmetrical—that is, when there is a disproportionate number of underachievers—it indicates that specific deleterious factors are operative. Thus, if there are specific forms of reading disability, one would find within the population an asymmetrical distribution curve,

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with an increased number of individuals with severe degrees of reading impairment.

Reading Retardation and Reading Backwardness

The question of specific forms of reading disability and distribution of reading impairment has been investigated in a statistical study of an entire school population of 11,000 children of the Isle of Wight (Rutter and Yule 1975). When this population was analyzed, it was found that the number of poor readers was indeed greater than could be accounted for by chance (Table I).

Table I
Frequency of reading retardation
in selected population*

	%
Frequency predicted on basis of standard distribution	2.28
Observed in Isle of Wight 10 yr. olds	3.50
Observed in Isle of Wight 14 yr. olds	4.50
Observed in London 10 yr. olds	7.60

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*Rutter and Yule 1975.

This situation is similar to that which exists with respect to overall intelligence; here also there are disproportionate numbers on the low IQ end of the scale. One might hypothesize that reading ability relates to IQ and that the asymmetrical curve for reading ability simply reflects the asymmetrical curve for intelligence.

That possibility was tested by dividing the poor readers within the Isle of Wight population into groups: those whose IQ was within the normal range (called "retarded readers") and those who were also backward in other abilities and had a low IQ (called "backward readers"). When these two groups were compared on a number of bases, *qualitative* differences emerged. The specific reading retardation was much more common in boys than in girls, less likely to be associated with overt neurological damage, and more commonly associated with constructional difficulties and poor coordination (Table II). Both groups showed a high frequency of delay in language development. Most significantly, when these two groups

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of children were retested at age 14 after conventional instruction, the specific reading retarded group was behind the backward (mentally retarded) group in reading but ahead in mathematics.

Table II*

	General Reading Backwardness	*Specific Reading Retardation*
% Boys	54.4%	76.7%
Evidence of neurological impairment	11.4%	0.0%
Constructional difficulties	59.4%	25.6%
Clumsiness (Oseretsky)	52.0%	31.4%
First words after 18 months	34.9%	32.9%
Spelling attainment (Schonell) at age 14 yrs.	102.0%	94.0%
Arithmetic score (Vernon) at age 14 yrs.	16.0%	19.0%

*Rutter and Yale 1975.

From these studies, it is clear that within a general population there is a group of individuals who have special difficulty in learning to read in spite of normal intelligence and conventional instruction, and who differ also in other respects from a comparison group whose poor reading is associated with mental retardation—i. e., the retarded readers *are* qualitatively different.[1]

Subgroups in Dyslexia

Still at issue, however, is the question as to whether dyslexia represents a biological entity—a single "disease." Are these retarded readers a homogeneous group, or are there various forms of dyslexia? Possibly the most definitive data on this question are derived from genetic studies. A recent study of 75 first-degree relatives of dyslexic individuals revealed that 45 percent of these relatives also had reading problems (Finucci et al. 1976). However, no single mode of genetic transmission was evident. It was concluded that the disorder is genetically heterogeneous and that subgroups should be looked for.

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[1] See also L. Eisenberg, "Strategies for Recognition and Management of Reading Disorders" (pp. 39–55). *Editor*

Several different investigators have attempted to find such subgroups. Naidoo (1972) performed a battery of psychological tests on a group of poor readers and then used a cluster analysis study to look for subtypes. Through this analysis, four groups were artificially created.

> Some striking differences between [these] groups suggest that there may be more than one type of genetic dyslexia—one characterized by speech and language delays and disorders, and another by atypical patterns of laterality . . . another group showing evidences of neurological impairment and difficulty in reproducing visual patterns from memory.
>
> Common to all groups were a high frequency of difficulty in blending a sequence of sounds into a whole word, and low scores on digit span and coding—all involved a serial ordering process.

That there should exist such heterogeneity among poor readers is not surprising. The acquisition of reading represents the end goal of a series of processes, and breakdown or weakness at any point in this chain may lead to the same final outcome—failure to read.

There are a number of requirements for learning to read.

1) The individual must have mastered the spoken language and should have some concept of its structure and of laws governing its usage.
2) He must be able to differentiate between complex visually presented patterns and to recall them.
3) He must learn to associate a specific visually presented symbol with the sound it represents.
4) In so doing, he must convert a visual pattern to a temporal sequence.
5) He must either associate a visual pattern with its "meaning" or, more commonly, associate the patterns with a phonemic counterpart and relate that to meaning.
6) He must have some mechanism for oral or manual expression.

Each of these somewhat different functions is carried out by different parts of the brain. In general, in right-handed persons, the primarily linguistic and sequential functions are performed by the left side of the brain. Thus, control of speech and of fine movement is a function of the left side. The evaluation of spatial relationships and the recognition of unfamiliar faces and patterns is most effectively accomplished with the right side of the brain (Table III).

Table III*

Functions more effectively performed within the right hemisphere
- *Visual*
  - Two dimensional point localization
  - Dot and form enumeration
  - Stereoscopic depth perception
  - Recognition of faces or nonsense figures
- *Manual*
  - Braille recognition
  - Pattern recognition
- *Auditory*
  - Non-speech sounds
  - Melodic pattern

Functions more effectively performed within the left hemisphere
- *Visual*
  - Letter and word recognition
- *Manual*
  - Skilled movement
  - Speech
- *Auditory*
  - Word recognition
  - Nonsense syllable recognition

*After Kimura 1973

Different Patterns of Reading Disability

Based on the consideration of different functions carried out by different parts of the brain, it is possible to postulate several different patterns of reading disability. Individuals with inadequacy of the right side of the brain might exhibit difficulties in letter recognition and recall. Deficiencies of the left side would be associated with delayed language development, poor sequencing, and problems with auditory memory and verbal recall. The more anterior portions of the left brain control hand movement and motor speech. Deficiencies in these mechanisms might lead to delayed or poorly articulated speech and/or difficulty in writing.

In addition to these types of deficiencies, one can also postulate, as did S. T. Orton, the existence of a group of individuals whose problem stems from poor coordination between the two hemispheres—in some instances, reflecting an unusually advanced development of the right hemisphere (Symmes and Rapaport 1972). It should be noted that in the initial stages of reading, letter recognition may be performed best in the right hemisphere, while its association with sound requires a link with language patterns already established in the left.[2] Orton suggested that confusion or conflict relating to the transfer of visually perceived patterns from the right to left hemisphere might account for the tendency toward letter and word reversals which occasionally forms a prominent feature in dyslexic individuals.

Clinical experience has to some extent supported these theoretical concepts. Most investigators have described at least two groups of poor readers, one deficient in visual-spatial skills and the other with linguistic-dysphonetic or audiophonic disabilities (Boder 1971; Ingram et al. 1970; Myklebust and Johnson 1965; and Mattis et al. 1975). Several authors (Mattis et al. 1975; Ingram 1969; and Myklebust and Johnson 1965) describe a third group with special problems in sequential analysis and graphomotor skills. In these studies, those with language problems account for approximately 60 percent. Pure visual perceptual and constructional deficiencies are relatively rare, accounting for approximately five percent of dyslexic individuals.

Subgroups in Dyslexia and Teaching Strategies

In view of the diversity of the underlying disabilities within a population of dyslexic children, it seems surprising that there has not been more evidence of a need for a corresponding individualization of teaching strategies. At a grosser level, this need has in fact been pointed out by Rutter and Yule (1973) in their comparison of "reading backward" and "reading retarded" children. These authors conclude that "It may be that [these] two groups of poor readers require different remedial approaches. This possibility requires study, and such study might lead to more effective remedial procedures."

With the development of the Orton-Gillingham approach, many feel that Rutter and Yule's hypothesis of the need for a special intervention technique for retarded readers has been substantiated. However, if there are indeed subgroups of dyslexic individuals, one wonders whether a single method is of necessity the best for all subtypes. Experienced teachers report that the Orton-Gillingham approach works for almost all dyslexic children. There are several possible explanations for this paradox.

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[2] See also D. Bakker, "Hemispheric Differences and Reading Strategies: Two Dyslexias?" (pp. 84–100). *Editor*

1) The studies cited above indicate that a great majority of dyslexic children suffer from auditory and linguistic (left hemisphere) forms of the disorder. Possibly the less numerous subgroups are in fact not being noted or served effectively within the larger group.

2) The Orton-Gillingham approach, with its emphasis on multisensory learning, may be so broad in its intervention that it is capable of overcoming a variety of deficiencies. Certainly, a diversity of remedial processes is included: multisensory drill on letter shape and configuration, reinforced by verbal description; drill and repetition on grapheme-phoneme association; use of logic and linguistic analysis to compensate for poor memory for phonetic detail and for the lack of intuitive understanding of the structure of the language. All these, plus more subtle approaches, are included. There may be here a sufficient diversity to meet any specific deficiency.

3) Given these many facets of the Orton-Gillingham approach, it is also probable that skillful and experienced teachers may intuitively modify their approach and emphasis to meet the needs of the individual child, selecting from among this broad armamentarium those strategies that work for each one.

Conclusion

The issue of definition in an important one. The answers to the questions raised are not clear, yet they are of both theoretical and of practical importance. With increasing clarification of the underlying deficits of the dyslexias, and with the ability to analyze them within the individual, the opportunity now exists to re-analyze our teaching strategies in order to discover with greater clarity those that are most effective for each definable type of child.

References

Boder, E. 1971. Developmental dyslexia: prevailing diagnostic concepts and a new diagnostic approach. *In* H. R. Myklebust (ed.). *Progress in Learning Disabilities. Vol. II.* New York: Grune and Stratton.

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Duane, D. D. 1977. Developmental dyslexia: etiologic theories and therapeutic implications. *Psychiatric Annals* 7:37–47.

Finucci, J. M., Guthrie, J. T., Childs, A. L., Abbey, H. and Childs, B. 1976. The genetics of specific reading disability. *Annals of Human Genetics* 40:1–23.

Ingram, T. T. S., Mason, A. W. and Blackburn, I. 1970. A retrospective study of 82 children with reading disability. *Dev. Med. and Child Neurol.* 12:271–281.

Ingram, T. T. S. 1969. The nature of dyslexia. *Bull. of the Orton Soc.* 19:18–50.

Kimura, D. 1973. The Asymmetry of the human brain. *Sc. Amer.* 228:70–78.

Mattis, S., French, J. H., Rapin, I. 1975. Dyslexia in children and young adults: three independent neuropsychological syndromes. *Dev. Med. and Child Neurol.* 17:150–163.

Myklebust, H. R. and Johnson, D. J. 1965. Dyslexia in childhood. *In* J. Hellmuth (ed.). *Learning Disorders.* Seattle, Washington: Special Child Publications.

Naidoo, S. 1972. *Specific Dyslexia.* London: Pitman.

Rutter, M. and Yule, W. 1975. The concept of specific reading retardation. *J. of Child Psych. and Psychiatry* 16:181–197.

Rutter, M. and Yule, W. 1973. Specific reading retardation. *In* L. Mann and D. Sabatino (eds.). *The First Review of Special Education.* Philadelphia: Buttonwood Farms/J. S. E. Press.

Symmes, J. S. and Rapoport, J. L. 1972. Unexpected reading failure. *Amer. J. of Orthopsychiatry* 42:82–91.

Specificity and Parameters in Defining Dyslexia

Jeannette Jefferson Jansky, Ph.D.

Educational Director, Robinson Reading Clinic
Columbia Presbyterian Medical Center
New York City

Attempts to set down the parameters of specific reading disabilities have engendered considerable controversy, and a good deal of contention has centered around the definition of the conditions to which the term "dyslexia" is applied.

Recent Definitions

The World Federation of Neurology has defined specific developmental dyslexia as "a disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and socio-cultural opportunity. It is dependent upon fundamental cognitive disabilities which are frequently of constitutional origin" (Critchley 1970). Benton (1975) noted that this is a definition by exclusion. Its lack of specificity has disturbed some theorists; moreover, the level of severity of reading retardation to warrant the designation "failing" is not set forth, nor is what is meant by "conventional instruction"; and finally, proof that the disability is of constitutional origin continues to remain elusive (Rutter 1978).

Members of the United States Congress have drafted legislation to support remedial education for handicapped children: Public Law 94-142. Young people with reading problems are viewed as a subgroup within the general category of specific learning disabilities. According to the 1976 draft, children with learning disabilities are:

> . . . those children who have a disorder in one or more of the basic psychological processes involved in understanding or using lan-

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> guage, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage (Office of Education).

It is specified that children with specific learning disabilities may not represent more than one-sixth of the children eligible to be counted as handicapped, and that a state may not count more than 12 percent of the number of five to seventeen year old children as handicapped. The foregoing reflects both the Congressional wish to insure services for the group targeted and concern about being able to provide funds for the services mandated. The formula proposed is designed to peg *severe* impairment, expressed by way of a proportion that specifies the lag below expected levels based on intelligence. It is clear, then, that diagnosis has come, through the best intentions, to be a prime determiner of whether or not some children will receive treatment.

Rutter and Yule (1973) have approached the problem of definition by emphasizing the presenting symptom, omitting reference to "perceptual handicaps," "brain injury," and the like. They distinguish between general reading backwardness, in which retarded reading is one aspect of *generally* lower attainment and related to low IQ, and *specific* reading retardation, in which underachievement in reading is determined by a regression equation based on reading test score, age, and IQ, thus relating the degree of a child's underachievement in reading to estimates of expected frequency of different degrees of underachievement.

Limitations of Rigid Definitions

All three definitions assume a correspondence between intelligence and reading ability. The retardation in reading is regarded as specific in the sense that it is out of line with expectations, given the individual's intelligence. It is the narrowness in selection that is imposed by the formula in two of the three definitions that has alarmed those whose business is delivery of services. Were a formula of the kind described to be applied, two categories of potential candidates who might be most responsive to treatment would be excluded from it: 1) children whose lags are less severe than the degree specified, and 2) children in the very early grades who are failing to learn to read (or who are at risk of failing), but have been in school too short a time to have accumulated the prescribed severity of delay status. Eisenberg (1978) has eloquently discussed the negative consequences of P.L. 94-142 for poor readers in the emotionally disturbed and disadvantaged categories.[1]

There are important arguments for and against the rigid definition of the syndrome. The choice made in an individual instance will inevitably be determined by the priorities of the particular job to be done. The researcher, the dispenser of funds, and the clinician each has a somewhat different focus. The researcher must have a reasonably rigid definition, even if it does not reflect the complexity of the reality, because s/he needs a design that is replicable and an unambiguous sample to more clearly set off the effects s/he is studying.[2] S/he is not primarily concerned with service. The funds dispenser needs a rigid definition so as to increase the likelihood of being objective in selecting *the* group, and no other group, to be supported, in order to adhere to budgetary stipulations. The clinician, on the other hand, is confronted by an overwhelming number of poor readers, who are intelligent but fall behind the expectations at their schools, and who are very teachable. Clinical experience suggests that by instituting intervention early for high risk children one can minimize the spiraling effects of failure. In fact, many teachers elect to remediate youngsters with marginal drops in performance in the expectation of returning them relatively quickly to the educational mainstream. It is undoubtedly true that the deviations these children show can be considered to fall along a continuum in severity. The use of a rigid cutting point to determine which child belongs to the group who receives help, is antipathetic to the clinician who is confronted with large numbers of children who would respond well to help and who show reading failure that is part of a picture that appears to fulfill the requirements of the syndrome in so many ways. Clinicians, therefore, usually use loose definitions.

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[1] See also Eisenberg's "Reading Disorders: Strategies for Recognition and Management." (pp. 39–55). *Editor.*

[2] The Rutter group based its differential descriptions of backward readers and those showing specific reading retardation on the unambiguous cases. Their characterizations do not apply to 32 percent of the sample that presented a mixed diagnostic picture (Yule and Rutter 1976). This important point should be remembered when generalizations from their results are made.

It is important to acknowledge the limitations of the definition selected, whichever one is chosen. This caveat certainly applies to my own admittedly loose, clinician's working statement. It is like the others in its emphasis on the problem with performance and in the omission of references to etiology (which remains an open question and is usually inferred, rather than proven). The following definition reflects the clinical reality that, in practice, the diagnostician is struck by the complexity rather than by the simplicity of the presenting picture: *specific reading disability is defined as a lag, in an intelligent child, in reading, spelling, or writing performance.* The word "lag" implies that the child's performance is worse than that of equally intelligent peers taught by the same teacher; it implies a degree of severity sufficient to interfere with academic functioning.

Effects of Variable Factors

Specific disabilities have been noted more frequently in boys than in girls, and have also been found to occur more frequently in some families than in others. These reading and spelling lags are often accompanied by a variety of characteristic deficits in other cognitive and language functions; moreover, they may be seen in isolation, or may coexist with impaired hearing and vision, with neurological and psychiatric disturbance, and in socio-economically deprived populations.

It follows that interaction among the aforesaid disorders will alter the presenting picture in a variety of ways; however, a *causal* relationship among the deficit areas is by no means implied. In fact, the diagnostician would be hard pressed to determine solely on the basis of test scores and the presenting reading, spelling, and writing disabilities, per se, whether or not an adequately intelligent child is or is not brain-injured, emotionally disturbed, or economically disadvantaged. The variables in question doubtless affect the *course* of the disability, but in ways that are not necessarily predictable.

It should be added, finally, that the salience of the reading disability will vary within each category. If a child's aggressive behavior, dating back to the time he was three, is so pronounced that he cannot tolerate group participation, economic factors may dictate that the behavior disorder will take precedence over his specific reading disability, if a choice of special services must be made. Or, if a child has abusive parents, or exists at near starvation level, obviously intervention will be directed first to the life-threatening conditions. These considerations, however, do not make the *existence* of specific reading disability any less a reality. Attention may be diverted to other aspects of a child's pathology, but the reading disability will affect the child's functioning whether or not it is recognized.

Effects of Developmental Change

It should be noted that in specific reading disability, as in other disorders of childhood, the problem exists against a backdrop of developmental change. The effects of coexisting conditions will vary with developmental level, and different components within the reading disability syndrome will take on different meaning at different developmental stages. Interactions occur horizontally, or concurrently, as well as vertically, along a time continuum.

Definitions of dyslexia frequently refer to accompanying characteristic deficits in cognitive and language functions, thus making an inference about the nature of specific reading disability.

Much has been said about the difficulties that dyslexic children have in managing patterns set out in space. Some specialists speak of perceptual problems and dyslexia as though the two were synonymous. Because some children tend to have trouble with nonverbal forms it has been concluded that the basic problem is with visual perception.

Researchers have pointed out that perceptual problems were quite apparent in adolescents and in older groups, both in cases of ongoing poor readers and among former poor readers (Silver and Hagin 1964). It by no means follows that the perceptual difficulties, per se, continue to have, or ever did have a uniquely significant bearing on reading performance. Satz and Van Nostrand (1973) postulated that it is the young child's difficulty in managing patterns set out in space that accounts for his *early* difficulties in learning to read, whereas at *later* ages it is the verbal deficits that account for trouble with reading. They cite studies that show the increasing significance, with age, of verbal IQ, and the diminishing importance, with age, of difficulty in managing patterns set out in space, for IQ. These studies cannot be interpreted as showing that, even at early ages, perceptual competence is the *only* contributor to trouble in learning to read, or that it is the most weighty contributor to difficulty in learning to read.

In the 1960's Birch and his associates (1964) undertook experiments that showed, they felt, that the problem lay not in a specific modality—auditory or spatial—but in crossing from one to the other, a manifestation referred to as a deficiency in intersensory integration. Subsequently Blank

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and her co-workers (1966) reported data that suggested the problem was attributable to inadequate verbal mediation.

Dyslexia and Generalized Language Disorder

The fact is that considerable recent research bears out Orton's early hypothesis that reading and spelling disabilities should be viewed as manifestations of a generalized language disorder (1937). Orton observed that, ". . . it is apparent to the critical observer that there are striking inherent or constitutional differences in certain children, apart from those of general intelligence, which markedly influence their acquisition of the language function. . ." (p. 19), having stated earlier that, "Communication of meaning may be accomplished by spoken sounds, by written or printed characters, or by symbolic gestures, and thus we may delineate the language faculty as the capacity to understand the spoken word and to reproduce it verbally, the capacity to understand the printed word and to reproduce it. . ." (p. 16).

Dr. Orton's work was followed up, in an operational way, by a number of clinicians. de Hirsch, participated with Langford, in the early 1940's, in establishing one of the earliest, if not the earliest, language disorder clinics in a major hospital (Columbia Presbyterian Medical Center). This center diagnosed and treated children presenting disabilities in both spoken and written language. de Hirsch's theoretical papers date from the early 1950's to the present (1952, 1975, 1977). Rabinovitch and his associates (1954) described the oral language difficulties of the poor readers he saw. In England, Ingram (1960) also characterized the oral language of samples of poor readers. More formally, in a doctoral investigation, Jansky (1970) found that a verbal factor in five-year olds was a core predictor of end of second-grade reading achievement. Vellutino (1977) has summarized much of the relevant research, including the results of his own studies and those of his associates, in support of the verbal deficit hypothesis. He concludes that, "The conceptualization of reading disability which we view as the most probable is that such disorders may be attributable to dysfunction in one or more aspects of linguistic functioning. . ." (p. 348). "Thus, children who lag behind their peers in general language ability. . . can be expected to have difficulty in one or more aspects of reading" (p. 349). Vellutino goes so far as to insist that the so-called perceptuo-motor activities are mediated verbally, and he may be right. Martha Denckla has frequently spoken in her lectures about the role, not always obvious, that language plays in the so-called nonverbal aspects of the neurological evaluation.

Conclusion

The concern for specificity in definition on the part of researchers and policy makers is understandable. Those on the line, confronted by children who need to be helped, and those who have a working familiarity with the complexity of the reading process, and of the reading disability syndrome, may share my reservations about this specificity: that in defining reading disability strictly in terms of a significant deviation from IQ, restrictions are imposed that may obscure important aspects and interactions in the clinical picture. I am in favor of careful selection of samples and of persistence in the search for better defining parameters. Until we have them it may be desirable to operate within looser guidelines and to base treatment on a careful evaluation of linguistic, cognitive, emotional and cultural functioning, when the aim is to teach individual children. If Alexander Pope's admonition (in "An Essay on Criticism," Part I) is kept in mind we should not go too far astray:

> First follow Nature, and your
> judgment frame
> By her just standard. . .

References

Benton, A. 1975. Developmental dyslexia: neurological aspects. *In* W. Friedlander (ed.). *Advances in Neurology 7.* New York: Raven Press.

Birch, H. and Belmont, L. 1964. Auditory-visual integration in normal and retarded readers. *Amer. J. of Orthopsychiatry* 34:852–861.

Blank, M. and Bridger, W. 1966. Deficiencies in verbal labeling in retarded readers. *Amer. J. of Orthopsychiatry* 36:840–847.

Critchley, M. 1970. *The Dyslexic Child.* Springfield, Illinois: Charles C Thomas.

de Hirsch, K. 1977. Interactions between educational therapist and child. *Bull. of the Orton Soc.* 27:87–101.

de Hirsch, K. 1975. Language disabilities. *In* A. Freedman, H. Kaplan, and B. Sadock (eds.). *Comprehensive Textbook of Psychiatry/II.* Baltimore: Williams and Wilkins.

de Hirsch, K. 1952. Specific dyslexia or strephosymbolia. *Folia Phoniatrica* 4:231–248.

Eisenberg, L. 1978. Definitions of dyslexia: their consequences for research and policy. *In* A. Benton and D. Pearl (eds.). *Dyslexia: An Appraisal of Current Knowledge.* New York: Oxford University Press.

Ingram, T. 1960. Paediatric aspects of specific developmental dysphasia, dyslexia, and dysgraphia. *Cerebral Palsy Bull.* 2:254–277.

Jansky, J. 1970. The contribution of certain kindergarten abilities to second grade reading and spelling achievement. Unpublished Ph.D. thesis. Columbia University.

Orton, S. 1937. *Reading, Writing, and Speech Problems in Children.* New York: W. W. Norton and Company.

Rabinovitch, R., Drew, A., DeJong, A., Ingram, R., and Witney, L. 1954. A research approach to reading retardation. *Proc. Assoc. Nerv. and Mental Diseases* 34:363–396.

Rutter, M. 1978. Prevalence and types of dyslexia. *In* A. Benton and D. Pearl (eds.). *Dyslexia: An Appraisal of Current Knowledge.* New York: Oxford University Press.

Rutter, M. and Yule, W. 1973. Specific reading retardation. *In* L. Mann and D. Sabatino (eds.). *The First Review of Special Education.* Philadelphia: Buttonwood Farms/J.S.E. Press.

Satz, P. and Van Nostrand, G. 1973. Developmental dyslexia: an evaluation of a theory. *In* P. Satz and J. Ross (eds.). *The Disabled Learner: Early Detection and Intervention.* Rotterdam: Rotterdam University Press.

Silver, A. and Hagin, R. 1964. Specific reading disability: follow-up studies. *Amer. J. of Orthopsychiatry* 34:95–102.

Vellutino, F. 1977. Alternative conceptualizations of dyslexia: evidence in support of a verbal-deficit hypothesis. *Harvard Educational Review* 47:334–354.

Yule, W. and Rutter, M. 1976. Epidemiology and social implications of specific reading retardation. *In* R. Knights and D. Bakker (eds.). *The Neurophysiology of Learning Disorders: Theoretical Approaches.* Baltimore: University Park Press.

Reading Disorders: Strategies for Recognition and Management

Leon Eisenberg, M.D.

Maude and Lillian Presley Professor of Psychiatry
Harvard Medical School
and
Senior Associate in Psychiatry
Children's Hospital Medical Center
Boston, Massachusetts

Although public concern about reading problems, of an extent sufficient to lead to congressional legislation on learning disabilities, is a phenomenon of our time, difficulty in learning how to read must be as old as the history of the written word. From the first, writing was "magic"; it conferred enormous powers on those privy to its secrets. Because literacy was a prerogative of a privileged class, there was not only *not* an expectation of competence for the masses, but the contrary: literacy was regarded as a skill reserved for the few who were expected to guard it jealously as the source of their authority.

The recognition that some children have trouble learning to read and that we ought to do something to remedy that trouble is part of the heritage of an egalitarian society and of the belief in universal education. Like the milder forms of mental retardation, reading disability is, in a sense, "schoologenic", that is, "caused" by schooling. (New York State Department of Mental Hygiene 1955). On the one hand, severe mental deficiency is recognized early and almost always remains a fixed characteristic of the individual. Milder retardation, on the other hand, is identified as a problem only in an academic context; it increases in tabulated prevalence in the later grades of school (despite the assumption that retardation is congenital) and it "disappears" as a social characteristic of the individual when the school-leaving age is attained. The slow learner is "lost" in the general population because no official institution counts which adults can and cannot master academic tasks.

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In similar fashion, public concern about reading difficulty is intimately connected with universal education. Obviously, there are no "poor readers" in a preliterate society; there are few identified poor readers in societies where only a minority of children are privileged to attend school. It is no coincidence that our awareness about the increasing prevalence of reading problems has paralleled the increasing amount of time American youngsters go to school. The average number of days in the year children are in school increased from 78 in 1870 to 163 (more than twice as many) in 1968; the percentage of adolescents attending secondary school increased from less than 15 percent at the turn of the century to more than 90 percent in 1970 (Coleman 1974). With more children in school for a greater proportion of time, the schools, as a social institution, detect more reading problems. Many of the children who would have been at risk in the past never went to school at all or dropped out early to enter the labor market. Thus, it is not possible to assess—claims to the contrary notwithstanding—the extent to which the proportion of poor readers has increased because of changes in the public schools, in attitudes toward schooling, in the survivorship of premature infants, or because of the impact of television or of other factors. What does appear certain is that the academic sieve that filters out reading problems has become finer simply because of the greater role of schooling in the life of young Americans.

The comparison with "schoologenic retardation" is an apt one; the reading-retarded school leaver disappears from official tabulations so long as he (and the poor reader is far more often "he" than "she") is able to melt into the general population in a life role which requires a minimum of reading. It is also true that such roles are becoming harder to find as well as less lucrative.

Some contend that the "epidemic of reading problems" headlined in the newspapers is an artifact of a society that labels normal children as deviants by categorizing them on reading performance rather than crediting them for the other skills they have. After all, the student with no eye for art or the one with no ear for music is just as "deviant" in a normative sense and just as shut out from a full appreciation of beauty. Yet, there is no "Orton Society for the Artistically (or Musically) Disabled." Such merit as there is in this argument resides in the point that we should be more concerned than we are about insensitivity to our humanistic heritage, whatever its form. Indeed, few of those busy lamenting poor national reading achievement do so because disabled readers will never thrill to Shakespeare, Balzac, or Tolstoy. Public policy concerns are purely pragmatic: the vocational handicaps and the dyssocial behaviors associated with poor reading. That, in my opinion, is a wrong-headed view. It is not less damaging to the quality of life in a humane society when the disabled reader is denied access to the enrichment of soul and spirit through great literature. I am prepared to join those who lament public indifference to music, art and dance and to argue that we should devote more of our educational resources to sensitize our children to beauty. However, I do not agree that the slighting of non-linguistic forms of expression justifies similar disregard for literacy; to the contrary, a proper concern for the value of reading should also extend to the development of all the mental faculties.

Thus, I start from the premise that backwardness in reading is indeed a handicap to the individual and not a mere artifact of an inappropriate social demand placed upon him. Then, what of the contention that differences in reading achievement simply reflect biological variation in human abilities—and are no more "pathological" than that some children are short while others are tall?

Variation in Reading Proficiency

Variation *is* a fundamental phenomenon in biology; stature may be taken as a prototype for the many phenotypic characteristics distributed in a population in a pattern that more or less fits the idealized Gaussian or "normal" curve shown in Figure 1. Nonetheless, the absolute value of the mean, the degree of symmetry of the curve, and the area under the tails are very much subject to influence by "pathological" factors.

Take the mean: the degree to which the diet of a human population approaches nutritional adequacy will be reflected in the average height of that population. For example, Nisei (second generation Japanese Americans) growing up in California in the 1940's and 1950's attained a stature several inches higher than that of Japanese children in their own homeland (Greulich 1958). As the economy of Japan burgeoned in the 1950's and 1960's, Japanese children in Japan grew to be as tall as Nisei in California. The influence of genetic control remains evident, despite the influence of environmental factors, because Japanese remain shorter than Caucasians growing up in similar circumstances.

Take the extremes: in every population studied, there are more individuals found at both the lower tail and the upper tail of the height dis-

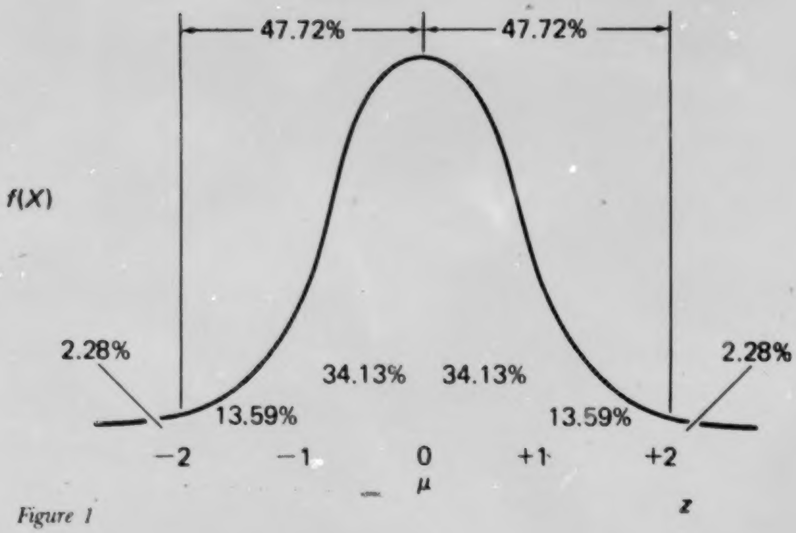

Figure 1

tribution than would be predicted on the basis of a "normal" distribution because of the presence of "dwarfs" and "giants," individuals whose growth or lack of it reflects pathologic genetic and endocrine events.

While variation in reading proficiency is to be expected even under optimal instruction (and indeed the expectation is built into the psychometric theory that underlies the standardization of reading tests), what we currently observe when children in an urban school system are tested for reading is not a "normal" distribution at all, but one which is skewed to the left and splayed far out to the right. Figure 2, which understates the current problem, displays the reading achievement scores attained by the 12,000 children in the fifth month of the 6th grade in a metropolitan school system a decade ago (Eisenberg 1966). Not only is the median displaced 15 reading months to the left, but more than a quarter of the children are two or more years behind grade level—despite the fact that children who had been identified as retarded and separated off into special classes are not included in the total.

The graph is, in fact, a composite or aggregate of the performance of several groups of children whose reading scores, had we been able to disaggregate them, would have yielded several different, overlapping graphs; that is, many more of the good readers were attending schools serving the middle class areas of the city and many more of the poor ones, inner city schools. The relationship between general social circumstance

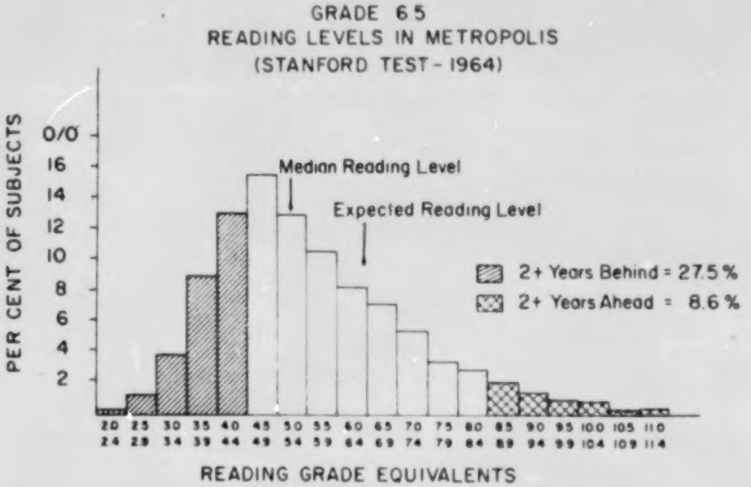

Figure 2

and reading proficiency is indicated in Figure 3 which replots the city school data on common axes with data from a more privileged suburban county and data from a still more privileged pair of private schools (Eisenberg 1966).

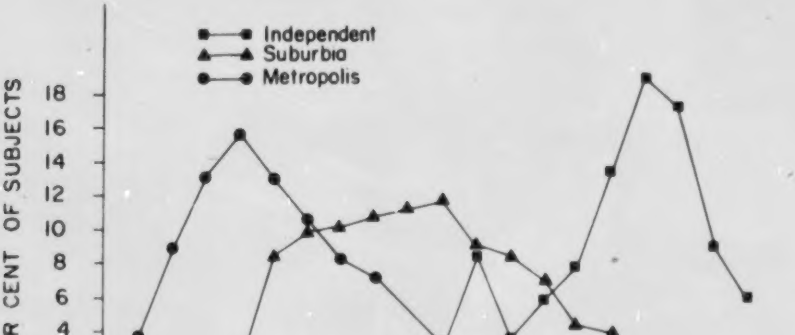

Figure 3

What accounts for these striking differences? It is conventional to attribute the differences to variations in "intelligence" for which IQ scores are taken as proxy. The mean group IQ for the city system averaged 94 in contrast to 126 for the private schools. Put aside, for the moment, the question of the validity of measuring IQ by group tests in children with limited reading ability; other studies we were doing at the time leave us with little doubt that individually administered tests would have shown similar, though not identical, discrepancies between the populations. The basic problem is one of primacy; on a group basis, one can "predict" IQ from reading scores about as well as one can "predict" reading scores from IQ. More to the point, one can predict both, with about the same accuracy, from the socio-economic status (SES) of the child's family (Bowles and Gintis 1973). Why SES, IQ, and achievement are so highly intercorrelated is a subject I have considered elsewhere (Eisenberg and Earls 1975) and will not discuss further here, except to indicate that the preponderance of evidence points to environmental rather than genetic sources for these associations.

Specific Forms of Reading Retardation

For our purposes, however, what is relevant is that most of the children at the low end of the distribution are not just poor readers; they are poor at arithmetic and poor at social studies; they are, in fact, poor learners. Since it is our task in this paper to consider primarily the child who fails to acquire proficiency in reading despite evidence of general adequacy as a learner, I will confine the rest of my remarks to "specific" reading retardation or so-called dyslexia. But before I do, let me emphasize the fact that most of the poor readers in our urban school systems are to be found among the ranks of poor learners. It would be irresponsible to overlook that problem in our preoccupation with dyslexia. Whether what we learn about one group will shed light on the other remains an open question. But it is incumbent upon us to make certain that this numerically larger problem is not lost from view as we attempt to come to grips with what, despite its importance, is the one that affects fewer children (Eisenberg 1966).

Evidence of Specific Reading Retardation. The best evidence we have that there is indeed a group of children with specific forms of reading retardation comes from the epidemiologic studies of Michael Rutter and his colleagues at The Maudsley Hospital. Employing the IQ as a measure of general learning ability and taking into account the correlation between reading score and IQ, Rutter and Yule (1975) constructed a regression equation to calculate the expected value of reading attainment for any particular level of the predictor variables: age and IQ. On the basis of group tests of IQ and of reading performance, discrepancies between expected and actual reading scores were used in the study of several populations of school children in rural and urban sites. If children with reading scores more than two standard deviations below prediction were simply the tail end of a normal distribution, the expected rate of such cases would be 2.28 percent of the population (by definition). In fact, the rate proved to be about 3.5 percent among 10-year olds and 4.5 percent among 14-year olds on the Isle of Wight and more than 6 percent (by reading accuracy) or more than 9 percent (by reading comprehension) among 10-year olds in London (Rutter and Yule 1976; Rutter, Tizard, and Whitmore 1970; Rutter, Yule, Quinton et al. 1975).

Specific Reading Retardation and Reading Backwardness. That the children identified in this fashion are different from generally backward readers is indicated by clinical and longitudinal comparisons of the two groups. Clinically, the children with specific reading retardation differed from backward readers in being preponderantly male and in exhibiting *fewer* neurologic signs and *fewer* abnormalities of speech and language (though more than a control group of normal readers). Even more striking was the longitudinal course of the two groups. The dyslexic children, despite an IQ 20 points higher (because of the way the two groups of children were defined) made *less* progress in reading and spelling over the next 5 years than did the backward pupils, although they made *more* progress in arithmetic.[1]

It is also noteworthy that, although somewhat more of the backward readers were from the lower social class, the difference between the two groups did not reach statistical significance. I emphasize this point because the definition of children with specific learning disabilities proposed for Public Law 94-142 excludes "children who have learning problems which are primarily the result of . . . environmental, cultural or economic disadvantage." The intent of the exclusion was presumably to separate out children with different types of problems. Unfortunately, it makes the presumption that the presence of one kind of problem excludes another. The data indicate otherwise. Among poor children, there will be a number with specific reading disability. Because of the limited resources their families command, it becomes essential that these children be identified and receive remedial help rather than being excluded from that help

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[1] See also R. Masland, "Subgroups in Dyslexia: Issues of Definition" (p. 23). *Editor.*

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for the very reason of the resource constraints which put them at the greatest need.

Heterogeneity of Specific Reading Retardation. Epidemiological findings parallel medical experience in finding more children than expected (on the basis of a normal distribution curve) at the lower extreme of population values for height because of the presence of dwarfing secondary to achondroplasia, hypopituitarism, and the like, or the finding of more children than expected with IQ less than 50 because of Down's Syndrome, birth injuries, metabolic abnormalities and the like. The comparison is instructive, for it tells us that although the epidemiologic studies establish that pathology rather than normal variation is at issue, they are not equivalent to finding a single specific disorder. In the examples cited, we find short stature, in the one instance, and mental subnormality in the other, as final common pathways for the expression of a large number of discrete disorders. Precisely such is true for reading retardation.

If I spend so much time on the obvious, I do so because the obvious seems to have been forgotten in many of the educational and research approaches to the diagnosis and remediation of "dyslexia." We have reified the name we use to describe a functional handicap as though naming were the same as understanding its nature and as though finding a common handicap implied a common cause.

The problem is further compounded by a failure to bear in mind the heterogeneity of the samples each one of us is likely to see. While the children who come to a neurologist or a child psychiatrist or an educational psychologist or a reading teacher may be referred because of concern about poor reading, they are not random members of the set of reading-disabled children; they have been selectively referred on the basis of a prior judgment, whether right or wrong, that the child is "brain damaged" or "emotionally disturbed" or "cognitively impaired" or "improperly taught" or what have you. While these categories are loose and sloppy, they may nonetheless correspond to some attributes that partially differentiate the children. As a result, the several specialists may be studying somewhat different samples. Furthermore, few investigators have attended to the likelihood that different factors contribute to reading failure at different developmental levels or that interactions between social and biological variables may multiply to yield handicaps that are not explicable in terms of a single variable acting alone. Many reports aggregate results from children who span a wide range of ages; they report data limited by an examination of only those characteristics that fall within the investigators' specialties. Thus, it should not surprise us that the research literature yields so few findings that prove to be replicable.

Similar problems bedevil efforts to assess the effectiveness of remedial education. Because of the heterogeneity of the disorders which make up the class, "dyslexia," a remedial strategy that may be highly effective with species *P* may fail with species *Q* and yield only marginal results with species *R*. If the diagnostician cannot reliably separate *P* from *Q* from *R*, the results obtained from a study of particular remedial reading strategy will be better if the proportion of species *P* happens to be high in the mix of cases studied and worse if it happens to be low. Thus, outcome differences in comparisons of teachers and/or methods of teaching may well reflect unanalyzed differences in the composition of the student groups assigned to each rather than in skills or tactics. From a clinical viewpoint, patient heterogeneity also argues for the importance of equipping remedial reading teachers with more than single theory and the techniques derived from it. Given the mix of problems and our inability to distinguish them clearly at the outset, it follows that only a "therapeutic trial" (that is, the serial application of several different methods to the same youngster in the hope of discovering what works best for him) will enable the teacher to help the largest proportion of handicapped readers. It may be this that accounts for the "artistry" of the remedial reading teachers whom each of us believes to be effective despite the difficulty in documenting this conclusion. It may be, but it obviously isn't necessarily so. We may simply be falling into the trap so common in clinical practice in the absence of controls; namely, of remembering the good results, while overlooking the Hawthorne effects and motivational factors that keep some youngsters and their families plugging away at obstacles when others give up.

Clinical Strategies

Thus far, I have undertaken the easy part of my task: identifying the limits of what we know. I can no longer delay the difficult part of the assignment: setting forth strategies within those limits for doing the best we can clinically, at the same time that we attempt to extend the frontiers of understanding. The first set of proposals that follow are addressed to the clinician who, despite the uncertainties and ambiguities of current knowledge, cannot turn away those seeking relief from today's misfortunes with nothing better than the promise more will be known tomorrow. I will conclude by outlining those research strategies which seem to me to be the most fruitful.

Terminology

First, I urge the importance of a proper regard for language; the language we professionals employ, that is. When labels conceal ignorance, they ought to be abandoned. To call a disorder *idiopathic, agnogenic* or *specific* is an arrogant way of saying "we don't know what causes it." The patient with a fever who is told by his doctor that he has *hyperpyrexia* has been mystified, not diagnosed. Just so is the case with the handicapped reader when he is relabelled as suffering from *dyslexia* or *specific reading disability*. Because the renaming of a problem implies greater precision than understanding warrants, it is a disservice to the diagnostician as well as the patient, in that we ourselves come to believe we have said something more than ordinary language serves to convey.

My point is not to prohibit words already well entrenched in the educational and medical literature. Prohibition won't work any better here than it did for alcohol abuse. What I do emphasize is that when one or the other term is used it be followed by such a translation as: "That means your youngster has a problem in learning to read, a problem which occurs in some 5 to 10 percent children for reasons which are not clear. We will try, as well as we can, to find out what can be done to help." The same caveat ought to be attached to the descriptors we attach in further categorizing the child's performance: *attentional deficit, visuomotor handicap, information processing difficulty, dysnomia,* or what have you. In a given instance, the description of behavior may be more or less accurate; its role as the "cause" of the reading problem is far from self-evident; and, in any event, providing the behavioral evidence from which the conclusory term has been derived is more serviceable than the term itself.

Assessment

Second, we should insist that assessment has only begun, rather than ended, when a performance deficit has been registered. What matters is the specification of the conditions which make success on that test item possible for that child. That is, if the test is timed, does the provision of more time enable the child to pass the item? If time is not the issue, is it the supplying of additional cues (and if so, what cues) or the removal of distraction, or enhancing motivation? These violations of test protocol are improper on the *first* run-through which is designed to measure performance under standard conditions in order to determine whether the youngster is doing as well as his peers. But a diagnostic appraisal that yields only test scores has forfeited its most important contribution; namely, pinpointing, insofar as possible, the sources of difficulty. My contention is not falsified because the examiner cannot succeed in this endeavor in every instance. All too often the failure results from blind adherence to standardized protocol because the evaluator has lost sight of the purpose of the examination. In addition, the report of deficits and their presumptive correlates must be accompanied by an equally rich description of talents. These can provide the means for the teacher and parent to enable the child to have experiences of success, essential for self-esteem, and may suggest alternative learning pathways to circumvent the disabilities.

Third, assessment statements have meaning only when they can be tied to therapeutic recommendations. It does not help the teacher to know, even if it is true, that the youngster has a short attention span unless one is prepared to suggest a pedagogic, behavioral, or pharmacologic means of minimizing the difficulty. I continue to be distressed by the many reports I see that read like a prosecutor's indictment of an habitual criminal. By the time the teacher has read through the long list of things wrong with the child, he or she has all of the rationalization necessary for abandoning any hope of betterment. Were these opinions based upon solid evidence, one might still regret the negative tone but be unable to argue against the conclusions drawn. However, when a mixture of supposition, theoretical bias, and lack of familiarity with the weight of the evidence results in a report which is inaccurate as well as damaging, a halt must be called. Not all children are winners, but we are not very good at predicting the outcome of the race. Every statement should reflect the uncertainties in our judgements.

Remediation

The fourth clinical strategy I propose is a mandated linkage between assessment and remediation. Consultants like myself live in a rarified world. We are asked to see a child on referral. After reviewing prior records, listening to the family, and examining the child, we formulate diagnostic statements and recommendations. More often than not, our report is transmitted by mail and we neither learn the response of the recipient to our counsel nor see the child again, even if reappraisal has been recommended. Even those of us who are more assiduous in trying to follow up our cases see only a fraction of them on return visit and then only the ones who were sufficiently pleased to think it worth returning. And yet we have the most to learn, in terms of improving our own performance, from patients who are the least satisfied with the outcome.

We ought to be forced to defend our judgement—or to learn the necessity of modifying it—in face-to-face conferences with the educators who will be working with the child and with the parents who will have to act as the child's advocates. I recognize that problems of distance and time will complicate the implementation of this recommendation. Yet, without being held answerable for the consequences of what we have said and for the progress, or lack of it, in each case, we are condemned—or, rather, our patients are condemned—to our doing no better tomorrow than we do today. We lack the feedback of consequences that is so crucial in modifying performance.

Parents and teachers have to live with the child. Day-to-day interactions keep them relatively honest. The only way to make a consultant "a real doctor" is to force him or her to attend to those problems. Information must flow in both directions.

Teacher Preparation for Remediation

The final clinical strategy I have already suggested: the education of remediators must familiarize them with all of the theories and techniques that have promise. Wedding a teacher to a single theory is to force students into a Procustean bed, with the limbs that don't fit or with the head itself lopped off. It may be reasonable to suggest that, given such and such a clinical profile, one recommends a particular technique as the most promising initial approach. But if results are not forthcoming after a therapeutic trial, the teacher must be equipped to change tactics and to explore seriatim the other remedial approaches in the hope of finding one that may be useful to the particular child. More than that, teacher education should go beyond technique to an emphasis on teaching and learning as a social enterprise in which the relationship among the participants may be more decisive for outcome than the details of method.

Research Strategies

In my view, the most formidable obstacle to research on reading disability has been what Adolph Meyer once termed "doctrines of exclusive salvationism." Most investigators have been so convinced that they were on the royal road to an understanding of dyslexia that they have studied a very narrow spectrum of functions. That has made it almost impossible to compare one study with another because, in addition to sample variability and age differences, the methods of investigation employed in one study often do not include any of the measures used in a second. Furthermore, results are reported as group averages rather than as distributions.

Given the premise that "dyslexia" is no more a unitary condition than "mental subnormality," and that it represents the final common expression of an unknown number of underlying disabilities, then comparison of mean test results among groups of disabled readers, as opposed to good readers, is likely to obscure important differences, particularly in view of the variable composition of samples. That is, if children with dyslexia, species *P*, have problems with phonological segmentation and those with species *Q* have difficulties with syntactic structure, then averaged results from a sample composed of unknown proportions of *P* and *Q* may not differ strikingly from the norms on either measure (although much greater variability should be found in the sample than in the standard). This concern for subtypes has special force in the design of genetic studies. I can see little profit in calculations of "heritability" of reading or other general psychological abilities across populations of retarded and normal readers and their families. Of course there will be familial resemblance; after all, there is in almost everything else. Pedigree analysis is much more likely to yield important clues by identifying within families of retarded readers one or more single gene subtypes (Childs and Fenucci 1978). It is my expectation that such syndromes, if they exist at all, will prove to be uncommon. But if they can be found, they will add very considerably to our understanding of fundamental mechansisms by putting us on track of neuropsychological traits that are among the precursors of reading ability.

In broadest terms, what is needed is the application of a wider spectrum of analytic methods than have thus far been employed, and tying them to conventional studies by repeating the other common measures with suggestive findings. Rather than attempt a comprehensive catalogue of what I consider to be promising approaches, I will focus on several areas that seem to me to have been insufficiently explored.

Linguistic Competence

The first is the thorough-going assessment of linguistic competence. The elegance and power of contemporary linguistic theory (N. Chomsky 1957) have only begun to be applied to empirical research on the development of language in the child. And yet all of us recognize that oral language competence not only precedes reading skills, but is the precondition for their acquisition. Retarded readers are often reported to have had earlier difficulties with speech development but the majority of them have no obvious problems, either by history or customary clinical observation. Yet "no obvious problems" means little in the absence of a detailed, informed, and specific examination of linguistic competence. This has not been often undertaken; worse, there is a paucity of data on normal development itself. There is evidence for a developmental sequence in acquiring increasingly more complex syntactic constructions (C. Chomsky 1969) Do disabled readers follow a similar sequence, merely delayed in time, or do they display a different one; and if such can be identified, do the differences have implications for remediation? We will not know until systematic studies have been carried out by competent linguists.

Metalinguistic Awareness. As Courtney Cazden (1974) has pointed out, language, for adults as well as children, is "transparent." When speaking or listening, we attend to meaning, not to speech sounds or words or syntax. Language becomes "opaque" only when there is a problem in grappling with it or when attention is called to it. The ability to focus on language forms themselves—metalinguistic awareness—is gradually acquired by children as their development proceeds; ability to reflect on our actions as well as to act is an uniquely human attribute. Attending to language qua language is an important part of the developmental process as evidenced by the word games that children play as they talk to themselves, to their peers, or to adults; the puns, the riddles, the "knock-knocks," the nonsense words of the child's world.

A long time ago, the Soviet psychologist, Vygotsky (1962) put forth the suggestion that progressively more explicit awareness of the nature and rules of language may be an essential step in learning how to translate from an oral to a written code. This has led linguists (Cazden 1972; Kavanagh and Mattingly 1972; Fowles and Glanz 1977) to propose what to me is an attractive hypothesis; namely, that systematic enhancement of metalinguistic awareness may facilitate learning how to read, even in relatively normal readers, but perhaps especially so in those who are slow.

So far as I know, there are no normative data on linguistic awareness nor evidence on whether retarded readers differ from their normal counterparts in this aspect. Nor do we know whether word games or bilingual instruction (Blank 1977) or other modes of language stimulation will accelerate the acquisition of metalinguistic competence. But I hazard the guess that this is a highly promising area for research and remediation.

Individual Sense of Competence. A second dimension which merits extensive exploration in children handicapped in reading is a concept Professor Robert White has called "sense of competence" (1959); that is, the individual's self-appraisal as distinct from objective assessment of competence. For the child, sense of competence has its roots in parental investment in that child as an unique being, but increasingly it comes to depend on the experience of success in social, athletic, and academic activities. The more highly those who matter for the child (family members, peers, teachers) value a particular skill, the more achievement in that area contributes to self-esteem and the more the mastery of that skill has salience for the child. I have stressed elsewhere (Eisenberg 1975) the devastating impact of reading failure on most children. Yet it is a common clinical observation that some poor readers, though not untroubled by their academic misadventures, manage to sustain a sense of worth.

Many teachers strive to enhance a sense of competence by using classroom activities that permit the demonstration of mastery by a particular child with particular talents. In similar fashion, clinicians have long advised parents to find ways to interact with their children free of the anxiety provoked by asking the child to read; in fact, many counsel parents to avoid reading instruction altogether and to leave it to a tutor, lest it color their relationship with the hue of failure. Thus, the idea that sense of competence must be nurtured in the dyslexic child is not a new one.

But so far as I know, it rests upon clinical anecdote and the appeal of face validity rather than systematic study. A young colleague, Anne Meyer, and I are planning to examine these issues, with the following propositions in mind. At the same level of reading difficulty, there are children with widely varying sense of competence. Having identified such youngsters, we propose to explore the sources of self-esteem in those who have achieved it. Secondly, we predict that reading progress will be more rapid in those youngsters with a greater sense of competence despite equivalent levels of disability; we invoke no more sophisticated reasons than the sustained morale provided by a sense of competence to support the child through the struggles of learning as well as its protective effect against behavior disturbance. If we are successful in identifying the sources of the sense of competence and in demonstrating (as we hope) its contribution to better outcome, we will design therapeutic interventions in the school setting to enhance sense of competence and test their efficacy as a complement to—not a substitute for—remedial reading instruction.

Conclusion

My emphasis on linguistic factors and sense of competence as exciting areas for clinical research reflects personal interest and in no way is intended to demean paradigms based on information processing or hemis-

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pheric specialization, which are equally promising models. Indeed, I would hope a number of models would be pursued in parallel, best of all in the same patients so that we might better establish whether they cluster together or identify diverse groups. There will, of course, be practical limits, both to the competence of any team of examiners and to the durability of any group of subjects in tolerating extended test sessions. In my view, the most meaningful research will be tied to clinical trials of the remedial methods suggested by research findings, first in the hope of benefitting the child, second in order to provide a further test of hypotheses.

There is no other way of beginning the task of developing new linguistic and psychological assessment tools than by exploring their utility with clinical and control groups. But once reliable and valid methods are at hand, it is essential that they be employed epidemiologically and longitudinally on stratified samples of a school population reappraised at appropriate intervals. Referred patients and cross-sectional studies simply will not suffice to provide a valid analysis of the distribution of reading problems, of their natural history, and of their response to remediation. It is high time that we began to think in these terms and to pool efforts to make such studies possible.

References

Blank, Marion. 1977. Personal communication.

Bowles, S. and Gintis, H. 1973. I.Q. and the U.S. class structure. *Social Policy* 3:65-96.

Cazden C.B. 1972. *Child Language and Education.* New York: Holt, Rinehart and Winston.

Cazden, C.B. 1974. Play and metalinguistic awareness. *The Urban Review* 7:28-39.

Childs, B. and Finucci, J.M. 1978. The genetics of learning disabilities. Ciba Foundation Symposium, London. In press.

Chomsky, C. 1969. *The Acquisition of Syntax in Children from 5 to 10.* Cambridge, Massachusetts: M.I.T. Press.

Chomsky, N. 1957. *Syntactic Structures.* The Hague: Mouton and Company.

Coleman, J.S. 1974. *Youth: Transition to Adulthood.* Chicago: U. of Chicago Press.

Eisenberg, L. 1966. Neuropsychiatric aspects of reading disability. *Pediatrics* 37:17–33.

Eisenberg, L. 1975. Psychiatric aspects of language disability. *In* D. D. Duane and M. B. Rawson (eds.). *Reading, Perception, and Language.* Baltimore: York Press.

Eisenberg, L. and Earls, F. J. 1975. Poverty, social deprivation, and child development. *In* S. Arieti (ed.). *American Handbook of Psychiatry,* Vol. 2. New York: Basic Books.

Fowles, B. and Glanz, M. 1977. Competence and talent in verbal comprehension. *J. Child Language* 4:433–452.

Greulich, W. W. 1958. Growth of children of the same race under different environmental conditions. *Science* 27:515–516.

Kavanaugh, J.F. and Mattingly, I.G. (eds.). 1972. *Language by Ear and by Eye: The Relationships between Speech and Reading.* Cambridge, Massachusetts: M.I.T. Press.

New York State Department of Mental Hygiene, Mental Health Research Unit. 1955. *A Special Census of Suspected Referred Mental Retardation, Onondaga County.* Syracuse: Syracuse U. Press.

Rutter, M., Tizard, J. and Whitmore, K. 1970. *Education, Health, and Behaviour.* London: Longman.

Rutter, M. and Yule, W. 1975. The concept of specific reading retardation. *J. Child Psychol. Psychiat.* 16:181–197.

Rutter, M., Yule, B., Quinton, D., et al. 1975. Attainment and adjustment in two geographical areas. *Brit. J. Psychiat.* 126:520-533.

Vygotsky, L.S. 1962. *Thought and Language.* Cambridge, Massachusetts: M.I.T. Press

White, R. 1959. Motivation reconsidered: The concept of competence. *Psychol. Rev.* 66:297-333.

Toward a Definition of Dyslexia: A Summary of Views

Drake D. Duane, M.D.

Associate Professor of Neurology, Mayo Medical School
Consultant, Department of Neurology, Mayo Clinic and Mayo Foundation
Rochester, Minnesota

Let me begin this approach to a definition of dyslexia by first stressing the paramount importance of the *general recognition* that within the population at large there exist individuals among whose behavioral characteristics is a salient manifestation of selective academic underachievement. And a second point to be emphasized is that such underachievement, when encountered in written language, is often the result of an innate biologic predisposition in language learning of the individual. If the first point is not appreciated, any discussion of definition will be merely academic and have no impact on the practical world of delivery of educational services. If such appreciation is achieved, however, the second point, regarding the innate biologic predisposition to this disability, assumes its proper importance in determining the specific remedial methods that should be employed and in deciding to whom such services should be offered.

The lack of acceptance of the concept of selective academic underachievement, both at the teacher-training institutions and among those in the active practice of education, is a major obstacle to an effective approach to this important problem. There has been a tendency to regard underachievement as a result either of general slowness in academic aptitude or of interfering sociocultural or emotional factors. In addition, there has been controversy concerning the term dyslexia. Since dyslexia represents a selective academic underachievement (most commonly interpreted by those in education as restricted to the area of reading, which I believe should be broadened to include written language), it therefore would be suspect to some. The word dyslexia has its origins in the field of medicine. For this reason, apparently, it has been regarded as being inappropriate for

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education, which deals with learning and only indirectly with traditionally construed medical diseases. How have these attitudes come about? I believe an inspection of the history of education and the evolution of special education in the United States in the last half century provides some insights.

As American public instruction evolved, the major thrust was toward the education of a general population of learners. Only lately has there been a recognition of handicapping conditions that require a specialized educational environment. Initially, these were visible conditions related primarily to disorders of the senses, structural disease of the central nervous system—including general intellectual retardation—and orthopedic disorders. Those investigators who, in the late 19th and 20th centuries, recognized the existence of individual differences in aptitudes for learning and worked mainly in medicine, dealt in the main with extreme variations. With respect to reading competence, a term such as "congenital word blindness" would seem appropriate to them (Morgan 1896; Kerr 1897; Thomas 1905; Hinshelwood 1917). However, the work of Orton expanded upon these early observations, not only with regard to word-recognition skills but also to the broader areas of the reading process, written expression, and oral expression (Orton 1925, 1937). Orton appropriately commented on the variations in aptitude that existed for these educationally pertinent behaviors. But Orton's work and that of Critchley (1928, 1964, 1970), it seems to me, never made an important impact on the system of delivery of public education. What did strike the attention of at least some educators in the late 1930's and 1940's was the existence of students with unequivocal brain insult who might be backward in their educational development (Strauss 1939; Strauss and Werner 1942; Strauss and Lehtinen 1947; Strauss and Kephart 1955). Of course, these students often showed more backwardness in one aptitude than in another. In addition, within this population, a high percentage demonstrated social behavioral disturbances, motor incoordination, and perceptual handicaps. In any case, there emerged in this country a group of special educators, often with training in psychology and some interaction with the field of medicine, who recognized the existence of a syndrome associated with brain injury. And when behaviors reminiscent of those associated with unequivocal brain injury were encountered in children who were not clearly brain-injured, the assumption was made that the behavior was the result of putative central nervous system damage.

In the 1960's as part of the general civil rights movement in the United States, a call came from consumers (parents) for differential educational services. It was necessary, or at least considered expedient, to merge the two separate concepts—the one regarding the disorder as selective, predominantly language-based, and construed as innate; the other regarding it as more diverse in origin, with emphasis on social behavior, and considering it to be secondary to brain injury. An initiative was taken to alter the concept of minimal brain damage to that of minimal brain dysfunction (Clements 1966), emphasizing variation in function of the central nervous system. For a time it did succeed in setting aside the issue of cause, but the designation minimal brain dysfunction was considered inappropriate educationally (and indeed, without additional modifying statements, the term is not appropriate medically either). It fell to Samuel Kirk (Kirk and Becker 1963) to act as arbiter by suggesting the term "specific learning disability." Yet inspection of the definition that was provided—initially with the amendments of the Elementary and Secondary Education Act of 1969; Title VI, the Education of the Handicapped Act, Public Law 91-230 of 1970; and the more recently enacted Public Law 94-142—reveals that it emphasized underachievement in written and spoken language. However, despite the fact that the name was changed, general acceptance of this concept has not been achieved. Within educational journals (Divoky 1974; Letter to the Editor 1975), as well as privately and publicly, prominent figures in the field of education dispute the very existence of such a group of students. Rejection of the concept of selective academic underachievement appears to dominate the public education sector despite the enacted federal legislation.

Both Masland and Jansky (this issue) have referred to the Isle of Wight studies by Rutter and Yule (1973, 1975), which, despite their limitations, clearly demonstrated that, with respect to reading, a population of academic underachievers not only exists but is not at all rare. Even with their rigid criteria and bias against the term dyslexia (Rutter 1978), the percentage begins to approach 5 percent, and the characteristics are similar to those previously associated with the use of the term dyslexia. Five percent is not an insignificant figure when one takes into account that the combined frequency of cerebral palsy, epilepsy, and mental retardation does not equal 5 percent of the general population. Despite the shortcomings of the Isle of Wight studies (Eisenberg 1978, Jansky this issue), these data must be brought to the attention of those within the educational establishment. They provide a compelling argument, couched in terms that should be acceptable to those in education, for the existence of a population that is without neurologic handicap or socioeconomic bias and that is characterized by underachievement in reading and an invariably associated underachievement in spelling. These data should dispel the notion that the concept at least of this form of learning disability is a passing fad.

If, as the Isle of Wight studies suggest for these underachievers, the problem is not due to overt neurologic insult or to primarily social factors, why does the behavior occur? One factor, of course, could be the emotional milieu in which the child was raised. As Jansky (this issue) suggested, this factor cannot be ignored; indeed, as de Hirsch (1970, 1973) has suggested, it is a concomitant of the growth and development of the individual child. Yet investigators in clinical practice, attempting to maintain an open set of observations, are impressed by the number of such students in whom emotional factors, at least early in the course of the child's development, appear to be negligible. Furthermore, emotional disorders tend to have a general rather than a selective effect in reducing academic performance. Another common argument, however, is that it is the instructional system that is the culprit and that the manifest behavior of underachievement is a result of dyspedagogia. Certainly instructional methods will be important, and alteration of instructional methods can be expected to improve the prognosis for the child who is behind in his or her written language development. However, the observation of continuing relative underachievement in higher forms of written language comprehansion and expression (Weaver 1978) and of difficulty in mastery of a second language (Dinklage 1971) reinforces the concepts expressed by Jansky (this issue) and Vellutino (1977) that the discrepant skill in language learning is innate.

Although the concept of a brain-based variation from the norm (or perhaps one should say from the "usual") in physiologic performance (Conners 1970; Sklar et al. 1972; Preston et al. 1974; Symann-Louett et al. 1977; Weber and Omenn 1977), cerebral structure (Hier et al. 1978), or neuropsychologic behavior (Witelson 1977; Rourke 1978) has yet to be confirmed, enough information has emerged to indicate that such a brain-behavior association is tenable.

A common argument by educators is that cause is not important when it comes to management and prognosis. This question cannot be resolved at present, for not enough is known about various etiologic factors regarding their impact on educational strategy or the spontaneous course in persons with this problem. Although there has been an aversion to relating the medical approach to what is regarded as being primarily an educational matter, in medicine cause is important, for it often determines what the natural prognosis will be and it provides direction for efforts at treatment. This, I believe, is a powerful argument for the current attempts at subclassification of underperformance in written language (Johnson and Myklebust 1967; Boder 1973; Mattis et al. 1975; Rourke in press). A parsimonious classification of the dyslexias is yet to emerge, and I purposely use the plural. Furthermore, deference to those who have been engaged in the subclassification process and the remarks of Masland and Jansky (this issue) and my own clinical experience suggest that there is a spectrum of language disorders with regard to speech production, speech reception, written language production, and written language perception. This applies both to the extent of involvement and to the kind of involvement.

As I have suggested elsewhere (see, e.g., Duane 1977) whenever the term dyslexia is used, the hallmark of the behavior being described is that of an individual who, in comparison with peers matched for age and academic potential, is developmentally behind in the rate of development and the quality of written language competence. The term dyslexia is abused, I submit, when it is loosely applied to those persons who have a relative difficulty in spatial or temporal concepts, although these may, in fact, be seen in association with underachievement in written language. It would be a particularly useful type of research which attempted to define the correlation among behavioral subtypes within the dyslexic population, their neurophysiologic and neuroanatomic characteristics, and the implications of these characteristics for educational remedial strategy. This does not, of course, exclude the need for continuing sensitivity to the social and emotional conditions within which the student finds himself. Eisenberg (1975) has eloquently pointed out these continuing needs. Note that I refer to an *individual*, just as the person providing the remedial instruction is an *individual*. We must be mindful that the behavioral data compiled thus far have dealt with groups of students, not individuals; thus, they provide us with some generalizations only. But it is the individual who must be remediated. Thus, there must be a major turnabout in the public attitude toward instructional practices as well as in competence in dealing with individual students and their language-learning development.

As to who will be served by these remedial measures, Jansky (this issue) has clearly indicated that the defining will differ depending on the needs of the person doing the defining. An outcome of the social movement that resulted in the legislative establishment of the existence of a learning-disabled population was the grafting of a new specialty upon special education based on the concept that the student is handicapped.

This is a mixed blessing. As soon as one employs the word "handicap," the question arises how much of a given health or educational problem constitutes a handicap. Even in the areas of hearing and vision impairment, definition of what is deafness and what is blindness has not been easy. In a more complex behavior such as language learning, quantitative attempts at definition will meet with heated debate, as witnessed during the recent attempt at providing the regulations involved in the learning-disabled population to be served under Public Law 94-142. When such argument occurs among the professionals involved, it only reinforces the doubts of those who have already been skeptical about the existence of the condition. However, it is not the student who is illegitimate; rather, the legitimacy of prevailing school attitudes and the piecemeal delivery system of services are in question. This sequence of historical events and resultant attitudes has proved to be a hindrance to a realistic appreciation of and solution for the needs of these students.

It would appear difficult to treat all students who demonstrate dyslexic characteristics under the existing structure of special education. My observation has been that there is mounting concern on the part of those in general education—which in most states provides remedial reading services—that special education is expanding at too great a rate and with potential sacrifice to those within the general school population and also with the risk of potential detriment to the unusually gifted child. In my view, a more appropriate system of delivery of education would be one in which those in general education possess a greater personal expertise and background in child development, language development, and behavioral observation. Furthermore, the general educator should have ready access to master teachers who, through their observation of behaviors in learning tasks and their repertoire of intervention strategies, would provide general educators with more tools to carry out their function. A probable consequence of such a delivery system, which should permeate all levels of educational services from preschool through postgraduate college training, would be not only improved progress for those currently underachieving but also better education for those who have been considered average learners and those who are unusually gifted. It has been a common experience in other professions that the study of those members of a population who are deviant in some regard (I use the term deviant in a statistical sense) have taught us much about the usual condition, which in medicine has traditionally been referred to as health. Perhaps this can be the case for education. Were there a dissociation between currently labeled special services and special funding allocations, and a more broadly based and more equitably distributed funding system, much of the harangue over definition would disappear.

Since 1970, the biggest problem for those in the real world of childhood, parenthood, and educational services has been whether the student in question "qualifies" for special services. In my view, settling this issue is more important than trying to answer theoretic questions regarding the magnitude of the discrepancy. I am more content to use such arbitrary cut-offs as degree of selective retardation in the design of research studies directed toward clarifying brain-behavior correlates. What is needed most, however, is to provide the latitude and encouragement that Jansky has called for in allowing the motivated, observant, and well-trained instructor to provide those services that he or she deems most appropriate to the needs of the child, with close monitoring of the child's development in all aspects of personal growth. For there to be an increase in the numbers of such educators, in-service training must extend beyond the lecture hall and include "hands on" demonstration and practice. One would continue to involve the parent in this process as well as the student. Even the question of incidence—which hangs on the question of definition—takes on greatest significance when it is tied to funding. The question of cause takes on significance when it impinges on educational method. When we confuse coordination of limb with coordination of written expression, we confuse the issue of what is the most appropriate intervention plan.

The common denominator of all subclassifications of dyslexia is underattainment in receptive and expressive skills in written language. Thus, those behaviors that are pertinent to the development of competence in written language, referred to by Masland (this issue), are the ones that merit our attention. If the thesis is that in the majority of instances the deficit is a linguistic one, then the hallmark of our observation and remediation must be linguistically pertinent. As a consequence, there will be more than one definition of dyslexia, depending on the needs of the individual utilizing the definition. Furthermore, as Myklebust (1978) has suggested, multidisciplinary and concerted efforts should be made in the study of the dyslexias (written language underachievement) as have been attempted for spoken language disorders (the aphasias). Therefore, whenever we report our research and describe the educational and behavioral characteristics of our students, we must be precise and indicate by what means we have chosen to use the term dyslexia or language-learning disability. We may choose to modify it as mild, moderate, or severe, but we cannot allow the degree of discrepancy to be the major characteristic determining the access of the student to a free and appropriate public education.

References

Boder, E. 1973. Developmental dyslexia; a diagnostic approach based on three atypical reading-spelling patterns. *Dev. Med. Child Neurol.* 15:663-687.

Clements, S. D. *Minimal Brain Dysfunction in Children: Terminology and Identification* (Public Health Service Publication no. 1415). Washington D.C.: Government Printing Office.

Conners, C. K. 1970. Cortical visual evoked response in children with learning disorders. *Psychophysiology* 7:418-428.

Critchley, M. 1928. *Mirror-Writing.* London: Kegan Paul, Trench, Trubner and Company.

Critchley, M. 1964. *Developmental Dyslexia.* Springfield, Illinois: Charles C Thomas, Publisher.

Critchley, M. 1970. *The Dyslexic Child,* 2nd Edition. Springfield, Illinois: Charles C Thomas, Publisher.

de Hirsch, K. 1970. A review of early language development. *Dev. Med. Child Neurol.* 12:87–97.

de Hirsch, K. 1973. Early language development and minimal brain-dysfunction. *Ann. N.Y. Acad. Sci.* 205:158–163.

Dinklage, K. T. 1971. Inability to learn a foreign language. *In* G. B. Blaine,Jr. and C. C. McArthur (eds.). *Emotional Problems of the Student,* 2nd Edition. New York: Appleton-Century-Crofts.

Divoky, D. 1974. Education's latest victim: the "LD" kid. *Learning MagazineCreative Teaching* 3(2): 20–25.

Duane, D. D. 1977. Development dyslexia: etiologic theories and therapeutic implications. *Psychiatric Annals* 7:37–47.

Eisenberg, L. 1975. Psychiatric aspects of language disability. *In* D. D. Duane and M. B. Rawson (eds.). *Reading, Perception and Language.* Baltimore: York Press, Inc.

Eisenberg, L. 1978. Definitions of dyslexia: the consequences for research and policy. *In* A. L. Benton and D. Pearl (eds.). *Dyslexia: An Appraisal of Current Knowledge.* New York: Oxford University Press.

Hier, D. B., LeMay, M., Rosenberger, P. B. and Perlo, V. P. 1978. Developmental dyslexia: evidence for a subgroup with a reversal of cerebral asymmetry. *Arch. Neurol.* 35:90–92.

Hinshelwood, J. 1917. *Congenital Word-Blindness.* London: H. K. Lewis andCompany.

Johnson, D. J. and Mykelbust, H. R. 1967. *Learning Disabilities: Educational Principles and Practices.* New York: Grune and Stratton.

Kerr, J. 1897. School hygiene, in its mental, moral and physical aspects. *J. R. Stat. Soc.* 60:613–680.

Kirk, S. A. and Becker, W. (eds.). 1963. *Conference on Children With Minimal Brain Impairment.* National Society for Crippled Children and Adults,Chicago, Jan. 13-15.

Letter to the Editor. 1975. The LD movement: brilliant star or glaring copout? *Learning* 3(8):26–36.

Mattis, S., French, J. H. and Rapin, I. 1975. Dyslexia in children and young adults: three independent neuro-psychological syndromes. *Dev. Med. Child Neurol.* 17:150–163.

Morgan, W. P. 1896. A case of congenital word blindness. *Br. Med. J.* 2:1378.

Myklebust, H. R. 1978. Toward a science of dyslexiology. *In* H. R. Myklebust (ed.). *Progress in Learning Disabilities,* Vol. 4. New York: Grune and Stratton, pp. 1-39.

Orton, S. T. 1925. "Word-blindness" in school children. *Arch. Neurol Psychiatry* 14:581–615.

Orton, S. T. 1937. *Reading, Writing and Speech Problems in Children: A Presentation of Certain Types of Disorders in the Development of the Language Faculty.* New York: W. W. Norton and Company.

Preston, M. S., Guthrie, J. T. and Childs, B. 1974. Visual evoked responses (VERs) in normal and disabled readers. *Psychophysiology* 11:452–457.

Rourke, B. P. 1978. Reading, spelling, arithmetic disabilities: A Neuropsychologic perspective. *In* H. R. Myklebust (ed.). *Progress in Learning Disabilities,* Vol. 4. New York: Grune and Stratton.

Rourke, B. P. In press. Neuropsychological assessment of children with learning disabilities. *In* S. B. Filskov and T. J. Boll (eds.). *Handbook of Clinical Neuropsychology.* New York: Wiley-Interscience.

Rutter, M. 1978. Prevalence and the types of dyslexia. *In* A. L. Benton and D. Pearl (eds.). *Dyslexia. An Appraisal of Current Knowledge.* New York: Oxford University Press.

Rutter, M. and Yule, W. 1973. Specific reading retardation *In* L. Mann and D. A. Sabatino (eds.). *The First Review of Special Education,* Vol. 2.Philadelphia: J. S. E. Press.

Rutter, M. and Yule, W. 1975. The concept of specific reading retardation. *J. Child Psychol. Psychiatry* 16:181–197.

Sklar, B., Hanley, J. and Simmons, W. W. 1972. An EEG experiment aimed toward identifying dyslexic children (letter to the editor). *Nature* 240:414–416.

Strauss, A. A. 1939. Typology in mental deficiency: its clinical, psychological and educational implications. *Proc. Am. Assoc. Ment. Defic.* 63:85–90.

Strauss, A. A. and Kephart, N. C. 1955. *Psychopathology and Education of the Brain-Injured Child,* Vol. 2. New York: Grune and Stratton.

Strauss, A. A. and Lehtinen, L. E. 1947. *Psychopathology and Education of the Brain-Injured Child,* Vol. 1. New York: Grune and Stratton.

Strauss, A. A. and Werner, H. 1942. Disorders of conceptual thinking in the brain-injured child. *J. Nerv. Ment. Dis.* 96:153–172.

Symann-Louett, N., Gascon, G. G., Matsumiya, Y. and Lombroso, C. T. 1977. Wave form difference in visual evoked responses between normal and reading disabled children. *Neurology* 27:156–159.

Thomas, C. J. 1905. congenital "word-blindness" and its treatment. *Ophthalmoscope* 3:380–385.

Vellutino, F. R. 1977. Alternative conceptualizations of dyslexia: evidence in support of a verbal-deficit hypothesis. *Harvard Educ. Rev.* 47:334–354.

Weaver, P. A. 1978. Comprehension, recall, and dyslexia: a proposal for the application of schema theory. *Bull. Orton Soc.* 28:92–113.

Weber, B. A. and Omenn, G. S. 1977. Auditory and visual evoked responses in children with familial reading disabilities. *J. Learn. Disabil.* 10:153–158.

Witelson, S. F. 1977. Developmental dyslexia: two right hemispheres and none left. *Science* 195:309–311.

NEUROLOGICAL CONCEPTS OF DYSLEXIA

Asymmetries of the Brain—New Developments

Norman Geschwind, M.D.

James Jackson Putnam Professor of Neurology
Harvard Medical School
Director, Neurological Unit, Beth Israel Hospital
Boston, Massachusetts

It is a great pleasure for me to be able to bring for the second time to the membership of the Orton Society a report on the progress in studies on the biological factors underlying cerebral dominance. In 1971 I had the opportunity to address the Society's membership at its annual meeting, held that year in Boston (Geschwind 1972). On this occasion, seven years later I am glad to be able to say that our knowledge in this area has advanced considerably.

I must, at this point, express my obligations to several of my colleagues. Dr. Marjorie LeMay of the Department of Radiology of the Massachusetts General Hospital and the Harvard Medical School must be given primary credit for the description of anatomical asymmetries of the brain visible in x-ray studies. These have made it possible to determine the presence of such asymmetries in intact humans. Her work has therefore made it possible to correlate the presence of asymmetries with handedness, and has opened up the field of study of children with learning disabilities. She is also responsible for the study of asymmetries in the skulls of ancient man and was the primary motivating force of the study on asymmetries in the brains of the great apes that she and I carried out jointly.

One of the major advances to be reported is the demonstration that areas with a particular pattern of nerve cells are increased in size in one hemisphere. The credit for this work goes to Dr. Albert Galaburda, who has worked in close collaboration with Dr. Thomas Kemper of the Neurological Unit and Department of Pathology of the Boston City Hospital where much of this work was carried out. How appropriate it is

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Dr. Geschwind is actively involved in the School of Health Sciences and Technology, a joint activity of the Harvard Medical School and the Massachusetts Institute of Technology in which he holds the post of Professor of Psychology. This paper is based on a Topic Session conducted by Dr. Geschwind at the 29th Annual Conference of the Orton Society, Minneapolis, 1978. Some of the work reported there was carried out under the following grants: NINCDS 06209 (to Aphasia Research Center, Department of Neurology, Boston University School of Medicine) and NSF BNS 77-05674 (to Department of Neurology, Beth Israel Hospital, Boston, Massachusetts).

that part of this work has been carried out at the Boston City Hospital where Dr. Samuel Orton served an apprenticeship in the Department of Pathology under the stimulating Dr. Frank Mallory. All of us also wish to express our gratitude to the Armed Forces Institute of Pathology for permission to use portions of the Yakovlev Collection of brain specimens in our studies. A summary of many of our studies is given in Galaburda et al. (1978).

I probably need not remind you of Dr. Orton's continued faith throughout his career that study of the nervous system would lead to a greater understanding of cerebral dominance and of such disorders as childhood dyslexia. Although the phenomenon of cerebral dominance was probably first discovered by Paul Broca, its basis remained controversial for over 100 years. Although anatomical asymmetry of the two halves of the brain had been suggested as one possible reason for the existence of dominance, it was generally rejected (Bonin 1962).

In 1968, however, a report appeared (Geschwind and Levitsky 1968) that established the presence of asymmetries in the planum temporale of the upper surface of the temporal lobe that were easily visible to the naked eye in brains examined at post-mortem. I reported on these in the earlier paper in this journal (Geschwind 1972). This study found that the left planum was on the average one-third larger than the right. It was also larger in 65 percent of brains with approximate equality in 24 percent, while the right side was larger in 11 percent. These results were soon confirmed by several other groups (Wada 1969; Teszner et al. 1972; Witelson and Pallie 1973; Wada et al. 1975). Of particular interest was the fact that these studies also established that these asymmetries were present in the fetus and newborn infant. Chi, Dooling, and Gilles (1977) showed that the asymmetry is visible at the 31st week of fetal life. It is thus clear that the asymmetry is not the result of post-natal experience.

Although these gross differences in the appearance of the two sides were impressive, it was still necessary to answer one important objection. The cerebral cortex is a continuous sheet of nerve cells, but its internal structure is not uniform. Under the microscope one can easily observe the nerve cells in an area of cortex. The pattern formed by the nerve cells varies in different parts of the brain. The main factors leading to variation are differences in the shape and size of the nerve cells in the layers of the cortex, and the number and size of distinctive layers. The borders between areas of differing structure are sometimes razor sharp, sometimes vague. It has often been assumed that each area of distinctive cellular structure is a functional unit, although this assumption has certainly not been tested extensively. If this assumption is correct, then one would take the view that anatomical asymmetry of the cortex meant that a certain area with a particular cellular structure was larger than the corresponding area on the opposite side of the brain. The sheer presence of an asymmetry easily visible to the naked eye would not prove that there was an asymmetry in the size of a region with a particular pattern of cellular architecture. It might be argued that although functional areas were of the same size on both sides, gross differences could be present simply because the brain was folded in a different way on the two sides. It seemed essential, therefore, to move to the next step, i.e., to the measurement of the actual sizes of areas of specific cellular architecture on the two sides. Dr. Galaburda undertook this mapping. The results have turned out to be clear-cut. A particular cortical area (called Tpt in the nomenclature of Sanides) was found in the first brain studied to be more than seven times as large on the left side as on the right. In a study of several further brains it was further confirmed that it was the greater extent of this region on the left side which accounted primarily for the greater extent of the planum on this side of the brain.

Galaburda and Kemper, having studied several normal brains, now turned to an investigation of an unusual anatomical specimen in the Yakovlev collection. This was the brain of an adolescent who had been diagnosed as dyslexic on the basis of psychological test studies and school performance. He also had a familial history of dyslexia. In addition, he suffered from epileptic seizures. The size of area Tpt was measured on the two sides of the brain. There was little difference in the size of this region in the two hemispheres. This lack of significant asymmetry, while interesting, was only suggestive. There was, however, an even more dramatic finding. On the right side, the cellular architecture of area Tpt was normal. On the left side, however, the structure of the cortex was unusual. The pattern of the layers was disrupted and was clearly atypical. In one section a striking abnormality could be seen. Normally, the first (outer) layer of the cortex contains few cells. Yet at one point the first layer of this specimen contained a clump of nerve cells, clearly abnormally located. There was thus an abnormality in the pattern of cortical architecture in the left-sided area Tpt, but no such abnormalities could be found elsewhere in the brain. This type of local abnormality in the structure of the cortex is well-recognized and is known to be responsible in many cases for epileptic seizures. It is interesting, however, that while such regions of malformed cortex are found in several different locations, they are not usually seen in one of the speech areas.

It is, of course, possible that one could be dealing here with a coincidence—a remarkable one—i.e., the presence of an abnormal area of cortex which was responsible for the epilepsy, but had nothing to do with the dyslexia. On the other hand, it is not unreasonable to speculate that the presence of an abnormality in an area of cortex involved in language may have been causative of the patient's dyslexia. Obviously, only further research will determine whether similar abnormalities are to be found in other cases of dyslexia. It is perhaps unlikely that such a change should be present in most dyslexics, but not unlikely that it is the cause in a particular group of such cases. The carrying out of this project will probably be slow since, fortunately, most patients with dyslexia are healthy. On the other hand, it will be important to study those cases which do become available. Galaburda and Kemper presented these findings at the American Neurological Association Meeting in September 1978 and are now submitting them for publication.

The asymmetry in the planum temporale is one that has so far been measured in brains obtained at post-mortem examination. It is important, however, to look for asymmetries that might be studied in the intact living person, since this might make it possible to correlate patterns of asymmetry with particular patterns of performance on psychological tests. The asymmetry in the planum has been observed occasionally in computerized x-rays of the brain. This occurs too rarely to be useful for study of large numbers. LeMay, however, has observed other asymmetries which can be seen with great regularity and can be easily quantified. The distribution of these asymmetries differs in right handers and left handers.

The first of these asymmetries is in the configuration of the Sylvian fissures on the two sides of the brain. The Sylvian fissure is the great cleft running more or less horizontally across the brain. Below it lies the temporal lobe, while above it lie the frontal and parietal lobes. The major language areas in the frontal, parietal, and temporal lobes all border on the Sylvian fissure. LeMay and Culebras (1972) found that in right-handed people the Sylvian fissure of the right hemisphere is angled up more sharply than the one on the left side. This asymmetry is also found in the brains of fetuses. Although this asymmetry can be readily detected in brains at post-mortem examination, it was first found by LeMay and Culebras in arteriograms, i.e. x-rays made after a substance which is opaque to x-rays is injected into the carotid artery, one of the major arteries supplying blood to the brain. Since the middle cerebral artery, one of the larger branches of the carotid artery, runs in the Sylvian fissure, comparison of the films of the right and left sides makes it possible to ascertain whether the fissure on one side is angled upward more sharply than the other.

This study of LeMay and Culebras was a landmark since it showed a clear-cut difference in the distribution of an anatomical asymmetry in the brain of right and left handers.

Table 1. Percentages of right-handers and left-handers having a Sylvian fissure angled up more sharply on the right ("right higher") or on the left, or with Sylvian fissures angled up equally on the two sides.

Group	*Right Higher*	*Equal*	*Left Higher*
Right-handers	67%	25%	8%
Left-handers	20%	70%	10%

LeMay went on to point out that the same asymmetry is visible on the inner surface of the skulls of ancient men (Neanderthal man, 30,000-50,000 years old and Peking man, about 300,000 years old) on which the Sylvian fissures on the two sides have left their impression. This makes it likely that cerebral dominance was an attribute of very ancient humans. Furthermore, LeMay and Geschwind (1975) could detect no asymmetry in the Sylvian fissures of monkeys. They found, however, that in the great apes, such as the chimpanzee and orangutang (the nearest relatives of humans in the animal kingdom), the asymmetry of the fissures on the two sides was just as striking as that seen in humans. This lends further support to the idea that cerebral asymmetry (and therefore, presumably, functional dominance) is evolutionarily ancient. Yeni-Komshian and Benson (1976) in an independent study found evidence for asymmetries in the chimpanzee.

LeMay was able to demonstrate another group of asymmetries which could also be seen in the living person by non-invasive methods, and which could be correlated with handedness or with the presence of certain clinical syndromes. In these studies she used computerized x-rays of the brain (CAT scans). The usual CAT scan presents a picture of a "slice" through the brain in a more or less horizontal plane. One can thus see the cleft between the hemispheres and the hemispheres themselves. In these pictures one finds that in most right-handed people the right frontal region is wider than the left, while the left posterior region is wider than the right. The same asymmetry, it should be noted, is found in the fetal brain.

The distribution of the asymmetry is different in the left-handers. Table II summarizes the data for the width of the frontal lobes.

Table II. Percentages of right-handers and left-handers having a wider frontal lobe on one side or having frontal lobes of equal width.

Group	*Left frontal lobe wider*	*Left Frontal width= Right frontal width*	*Right frontal lobe wider*
Right-handers	9%	21%	70%
Left-handers	20%	40%	40%

These data are rather typical for the differences so far found between right and left-handers in studies in which asymmetries have been studied in life. As can be seen, there is a larger percentage of left-handers than of right-handers in whom there is no asymmetry (40 percent versus 21 percent respectively). Furthermore, there are more cases with the reverse of the usual asymmetry (thus 20 percent of the left-handers have a wider left frontal lobe as against 40 percent of the right handers).

This work of LeMay has opened an approach to some further problems in the field of learning disabilities. Thus, Hier et al. (1978) have applied these findings by LeMay to the study of children with delayed speech. They have so far come up with a most intriguing set of data. Children with delayed speech fall into several categories. In some, this is a symptom of childhood autism, while in others the typical autistic features are absent. Some dyslexic children will also have delayed speech, while others have, of course, normal spoken speech. Hier and his colleagues found that all of these groups show certain deviations from the normal distribution of asymmetries of the posterior regions. Thus, the children with delayed speech show a higher percentage of cases in which the right posterior region is wider than is found in normals. This percentage is higher than expected, even when a correction is made for the increased number of left-handed children in this population.

These data, if confirmed, will certainly be of importance. In the first place, they clearly show that the population of children with delayed speech contains a large number of cases in which the nervous system differs from that of a population without speech delay. (It does not, of course, exclude that there are other cases which might be based primarily on adverse childhood experience.) The nature of the neurological deviation is, of course, still unclear. One possible interpretation is that these children have an unusual pattern of neurological organization, based either on heredity or on intrauterine effects, which leads to a delay in acquisition of speech. The second interpretation is that this population of children have had damage to the left posterior region, either at birth or within the first year. This could lead to a reduction in the size of the left posterior region and therefore to an increase in the number of cases in which the right posterior region is wider. Which of the two interpretations is correct remains unknown at this time.

It is probably fair to say that the study of the asymmetries of the human brain has opened new means of exploration of the biological bases of cerebral dominance. It is reasonable to hope that this new knowledge will not only deepen theoretical understanding, but will also facilitate the development of new biological-based therapies for cases with learning disabilities and with acquired lesions of the brain.

References

Bonin, G. v. 1962. Anatomical asymmetries of the cerebral hemisphere. *In* V. B. Mountcastle (ed.). *Interhemispheric Relations and Cerebral Dominance.* Baltimore: Johns Hopkins Press.

Chi, J. G., Dooling, E. C. and Gilles, F. H. 1977. Gyral development of the human brain. *Ann. Neurol.* 1:86-93.

Galaburda, A. M., Kemper, T. K., LeMay, M. and Geschwind, N. 1978. Right-Left asymmetries in the brain. *Science* 199:852-856.

Geschwind, N. 1972. Anatomical evolution and the human brain. *Bull. Orton Soc.* 22: 7–13.

Geschwind, N. and Levitsky, W. 1968. Human Brain: Left-Right asymmetries in temporal speech region. *Science* 161:186–187.

Hier, D. B., LeMay, M., Rosenberger, P. B. et al. 1978. Developmental dyslexia. *Arch. Neurol.* 35:90–92.

LeMay, M. and Culebras, A. 1972. Human Brain: Morphological differences in the hemispheres demonstrable by carotid arteriography. *N.E.J.M.* 287:168–170.

LeMay, M. and Geschwind, N. 1975. Hemispheric differences in the brains of the great apes. *Brain, Behav. & Evol.* 11:48–52.

Teszner, D., Tzacarus, A., Gruner, J. et al. 1972. L'asymétrie droite-gauche du planum temporale: A propos de l'étude anatomique de 100 cerveaux. *Rev. Neurol.* (Paris) 126:444–449.

Wada, J. 1969. Interhemispheric sharing and shift of cerebral speech function. (Presented at 9th Internatl. Congress Neurol, New York, Sept. 20-27). *Excerpta Medica Internatl. Congress Series.* 193:296-297.

Wada, J. A., Clarke, R. and Hamm, A. 1975. Cerebral hemispheric asymmetry in humans. *Arch. Neurol.* 32:239–246.

Witelson, S. and Pallie, W. 1973. Left hemisphere specialization for language in the newborn: Neuroanatomical evidence of asymmetry. *Brain* 96:641–646.

Yeni-Komshian, G. H. and Benson, D. A. 1976. Anatomical study of cerebral asymmetry in the temporal lobe of humans, chimpanzees, and Rhesus monkeys. *Science* 192:387–389.

Sex Differences in Hemispheric Specialization: Hypothesis for the Excess of Dyslexia in Boys

Daniel B. Hier, M.D.

Introduction

Boys are not only more likely to experience developmental language disorders than girls, but males as a group tend to be inferior to females in verbal ability. This review examines the hypothesis that sex differences in hemispheric specialization for verbal and spatial processing underlie the greater prevalence of dyslexia in boys as well as the differences in verbal ability.

Sex Differences in Prevalence of Developmental Language Disorders

Not long after the description of congenital word-blindness by Morgan in 1896, it was noted that specific reading disability (developmental dyslexia) was more common in boys than girls (Benton 1975). However, as Duane (1977) has observed, "there remains no explanation for the threefold to fivefold higher frequency of specific reading retardation in males." At higher levels of intelligence, the preponderance of male dyslexics becomes more striking. Lovell et al. (1964) found that among backward readers with IQ's less than 90, boys outnumbered girls 1.2:1, at IQ's of 90 to 99 boys outnumbered girls 5:1, and at IQ's of 100 and above boys outnumbered girls by 10:1.

Boys are also over-represented among children with delayed speech acquisition, infantile autism, and stuttering (Bentzen 1963). Although boys are somewhat more prone to experience other early life disorders such as mental retardation, cerebral palsy, and febrile convulsions, the sex ratios are hardly striking when compared to those noted for the developmental language disorders (see table).

Dr. Hier is a neurologist at the Massachusetts Rehabilitation Hospital, an Instructor in Neurology at the Harvard Medical School, and Clinical and Research Fellow at the Massachusetts General Hospital, Boston. The work reported in this paper was supported in part by NINCDS Fellowship NS05917-01 and presented at a meeting of the New England Branch of The Orton Society in October 1978.

Sex Ratios for Several Developmental Disorders.

	Male/Female Ratio
Developmental language disorders	
Infantile autism	3.8/1
Delayed speech acquisition	4.0/1
Developmental dyslexia	3.5/1
Stuttering	3.8/1
Selected other developmental disorders	
Febrile convulsions	1.3/1
Mental retardation	1.2/1
Cerebral palsy	1.3/1
Anencephaly	0.5/1

Sources: Treffert (1970), Orton (1937), Stevenson and Richman (1976), Millisen (1971), Kurtzke and Kurland (1973).

Sex Differences in Verbal and Spatial Ability

No consistent sex differences have been demonstrated for general intellectual ability (Fairweather 1976). Women as a group, however, tend to excel on tests of verbal ability, whereas men as a group tend to excel on tests of spatial ability (Garai and Scheinfeld 1968; Guilford 1967). As Maccoby and Jacklin (1974) remark, "female superiority on verbal tasks has been one of the more solidly established generalizations in the field of sex differences." A pattern of female superiority on measures of verbal ability emerges early in childhood. By age 18 months the speech quotients of girls exceed those of boys (Moore 1967). Girls use intelligible speech by a mean age of 21.7 months as compared to a mean age of 26.8 months in boys (Morely 1965). Girls remain about one year ahead of boys on tests of articulation through age eight years (Templin 1957).

Girls have better reading readiness skills than boys upon entering the first grade (Prescott 1955), and remain ahead of boys in reading achievement throughout grade school (Gates 1961). Sex differences in reading tend to be erased, however, by high school age (Stroud and Lindquist 1942). On tests of clerical speed and accuracy, spelling, grammatical ability, and verbal fluency, there are substantial sex differences favoring females that begin in childhood and persist into adulthood (Bennett et al. 1974; Hieronymus and Lindquist 1974; Hobson 1947). Consistent sex differences in vocabulary, memory, or reasoning ability have not been demonstrated.

Before age 12 years, boys and girls perform about equally well on tests of spatial ability (Bowd 1976; Coates 1974). However, after age 12 years, males perform substantially better than females on several space relations tests (Bennett et al. 1974; Hobson 1947). Spatial superiority of males is supported by their better performance on a variety of tests involving a spatial factor including embedded figures (Witkin et al. 1971); mazes (Porteus 1965); right-left descrimination (Bakan and Putnam 1974); judgment of horizontality (Kelly and Kelly 1977); mechanical reasoning (Bennett et al. (1974); and topographic orientation (Keogh 1971; Lord 1941).

Are There Sex Differences in Hemispheric Specialization?

As a first approximation, the dichotomy between left hemisphere specialization for verbal processing and right hemisphere specialization for spatial processing holds equally well for both sexes. Recent research, however, suggests that subtle sex differences probably exist in hemispheric specialization.

Men appear to have a greater dependence upon the right hemisphere for the mediation of spatial tasks than women. Lansdell (1962) has reported a decline in the scores of men, but not women, on the Graves design judgment test after non-dominant temporal lobe surgery. He concluded that "the results obtained with the women, unlike those with the men, do not conform to the hypothesis that an impairment in some aspect of human visual perception occurs after removals from the temporal lobe of the non-dominant hemisphere." McGlone and Kertesz (1973) found a greater impairment in the block design test scores of men than women after right hemisphere damage, and suggested that "specialization in the right hemisphere for non-verbal spatial functions is greater for males than females." Kimura (1969) found that in men, but not in women, dots were more accurately localized in the left visual field, presumably reflecting right hemisphere specialization for this spatial task. She concluded that this "could be interpreted to mean that differentiation of right and left hemispheres with respect to visuospatial ability may be greater in males than females." Men, unlike women, show a left visual field superiority for dot enumeration (McGlone and Davidson 1973), dot detection (Davidoff 1977), face recognition (Rizzolatti and Buchtel 1977), and perception of line direction (Sasanuma and Kobayashi 1978). Further, men show a left hand superiority for the tactile perception of shape (Witelson 1976) and line direction (Benton et al. 1978), whereas women show no particular hand preference on these tasks. Electroencephalographic techniques have demonstrated that men, unlike women, show greater right hemisphere activation during spatial tasks (Tucker 1976). These observations suggest greater right hemisphere specialization for spatial processing in men as compared to women.

Men may have greater left hemisphere specialization for verbal processing as well. Lansdell (1961, 1973) found that left temporal lobe surgery impaired the proverb interpretation and word association test scores of men more than women. McGlone (1978) has reported that in men left hemisphere damage produces a greater decline in verbal I.Q. than right hemisphere damage, whereas in women the decline in verbal I.Q. seems comparable regardless of the hemisphere damaged. These studies suggest more bilateral representation of verbal processing in women than men. Lake and Bryden (1976), utilizing dichotic listening techniques, have found a greater right ear superiority for verbal material (hence left hemisphere specialization for language) in men than women. They conclude that "studies dealing with sex differences in dichotic listening are virtually unanimous in showing greater laterality effects in men than women," and this suggests that "there are sex differences in cerebral organization. . . ." Men, when compared to women, show a strong right visual field superiority for the discrimination of words from non-words and for the memory of nonsense words (Hannay and Malone 1976; Bradshaw et al. 1977).

Thus, the current evidence supports the hypothesis of Bryden (1978) and Levy (1972) that men show greater left hemisphere specialization for verbal processing and greater right hemisphere specialization for spatial processing than do women. The initial suggestion of Buffery and Gray (1972) that men are less lateralized than women has not been substantiated.

Can Sex Differences in Hemispheric Specialization Explain the Excess Prevalence of Dyslexia Among Boys?

Given that there may be sex differences in hemispheric specialization (males showing greater hemispheric specialization according to whether a task is verbal or spatial, females showing greater bihemispheric participation regardless of whether a task is verbal or spatial), can these sex differences help to explain the preponderance of dyslexia in boys? Increased hemispheric specialization in boys could add to their risk of being dyslexic by two mechanisms: (1) by diminishing their overall verbal ability, and (2) by diminishing their ability to compensate for left hemisphere insults or unfavorable left-right anatomic asymmetries of the brain.

Possibly one of the most constant accompaniments of dyslexia is low verbal ability. Dyslexic children tend to have lower verbal than performance IQ's (Belmont and Birch 1966; Warrington 1967). Further, dyslexics with higher verbal IQ's tend to improve in reading ability faster than dyslexics with lower verbal IQ's (Trites and Fedorowicz 1976). Thus, part of the excess of dyslexia in boys may simply reflect the generally lower verbal ability of boys as compared to girls. The higher verbal abilities of girls may be related to their greater tendency to utilize both cerebral hemispheres in verbal processing whereas boys tend to rely more exclusively on the left hemisphere. Of course, this argument rests upon the somewhat simplistic assumption that two hemispheres are better than one, but it is possible that females derive some benefit from the synergistic functioning of both hemispheres in verbal processing that is unavailable to males who depend more fully on the left hemisphere. The more pronounced right hemispheric specialization for spatial processing in males correlates with their higher spatial ability. Individuals with stronger right hemisphere specialization for spatial processing tend to do better on tests of spatial ability (McGlone and Davidson 1973; Oltman et al 1977; Pizzamiglio 1974; Zoccolotti and Oltman 1978). Thus, males with greater right hemisphere specialization for spatial processing may gain higher spatial ability at the expense of verbal ability. Lower overall verbal ability in men may be translated into a greater risk of experiencing dyslexia as a child.

Strong left hemisphere specialization for verbal processing may put males at further risk of experiencing dyslexia by limiting their ability to compensate for either left hemisphere insults or unfavorable anatomic cerebral asymmetries. Before the age of six to ten years, language is largely spared in children with left hemisphere insults by transferring some or all language functions to the right hemisphere (Basser 1962). However, some children exhibit language deficiencies after early life left hemisphere lesions (Annett 1973; Dennis and Whitaker 1976), presumably reflecting an incomplete ability of the right hemisphere to compensate for left hemisphere damage. By virtue of greater bihemispheric participation in verbal processing, females may have brains better organized to shift language functions to the right hemisphere after left hemisphere damage. Conversely, greater right hemisphere specialization for spatial processing in males may inhibit the transfer of language functions to the intact right hemisphere after left hemisphere injury, and hence lead to a higher incidence of language disorders in boys as compared to girls after insults to the left hemisphere.

However, even if the female pattern of hemispheric specialization (with greater bihemispheric participation in verbal processing) does confer on girls some relative immunity from those language disorders that might arise from early life left hemisphere injury, this mechanism is unlikely to account for much of the excess of boys among dyselxics. Most dyslexics do not show evidence of left hemisphere damage on either neurological examination (Naidoo 1972) or on computerized brain tomography (Hier et al. 1978). A further explanation for the increased prevalence of dyslexia among boys might be that males are less able than females to compensate for unfavorable left-right anatomic asymmetries in the vicinity of the posterior language zone of the brain.

The right and left hemisphere are not exact mirror images of each other; left-right anatomic asymmetries can be demonstrated for many cortical areas (Blinkov and Glezer 1968). Of particular interest are left-right asymmetries involving the temporal planes (the temporal planes corresponding roughly to the posterior language zone). In from 65 to 90 percent of adult brains the left temporal plane is larger than the right (Geschwind and Levitsky 1968; Wada et al. 1975). Since language is usually lateralized to the left hemisphere, anatomic and functional asymmetries act synergistically to promote language proficiency in the left hemisphere. Hier et al. (1978) have speculated that developmental language disorders may be more likely to occur in children in whom function and anatomic asymmetries are not congruent. For example, an unfavorable circumstance for language development might exist if anatomic asymmetry of the brain were reversed with the right temporal plane larger than the left, yet hemispheric specialization remained normal with the left hemisphere dominant for language. Hier et al. (1978) did find an increased occurrence of reversed anatomic asymmetry in the posterior region of the brain (as assessed by computerized brain tomography) in dyslexic children. However, anatomic asymmetries of the brain can only be of consequence if hemispheric specialization exists. If only the left hemisphere is specialized for language, left-right anatomic asymmetries may be of crucial importance for the development of language. If both hemispheres share equally in verbal processing, these left-right asymmetries may be irrelevant to the development of language. Since males show strong left hemispheric specialization for language whereas females show more bihemispheric participation in verbal processing, anatomic asymmetries of the posterior language zone may be more critical determinants of the verbal abilities of males than females. Unfavorable anatomic asymmetries for language development (a smaller left temporal plane than right) may have adverse effects in males (including dyslexia and delayed speech acquisition) because of strong left hemisphere dominance for language. These same asymmetries may have little effect on the development of verbal abilities in females who are able to utilize both hemispheres in verbal processing and thus largely offset the adverse effects of unfavorable left-right asymmetries.

Conclusions

Sex differences exist in the prevalence of dyslexia as well as in overall verbal ability. These sex differences may reflect sex differences in hemispheric specialization: males show strong left hemisphere specialization for verbal processing and strong right hemisphere specialization for spatial processing whereas females show greater bihemispheric participation in both verbal and spatial processing. The greater hemispheric specialization observed in males may have implications including: (1) lower verbal ability than in females, (2) higher spatial ability than in females, (3) reduced potential for shifting language to the right hemisphere after early life left hemisphere injury, and (4) diminished capacity to compensate for unfavorable left-right anatomic asymmetries of the posterior language zone. Lower overall verbal ability as well as an inability to spare certain language skills effectively in the face of either unfavorable cerebral asymmetries or early life left hemisphere insults may partially explain the excess of developmental language disorders (and dyslexia in particular) in boys.

References

Annett, M. 1973. Laterality of childhood hemiplegia and the growth of speech and intelligence. *Cortex* 9:4–33.

Bakan, P. and Putnam, W. 1974. Right-left discrimination and brain lateralization: sex differences. *Archives of Neurology* 30:334–335.

Basser, L.S. 1962. Hemiplegia of early onset and the faculty of speech with special reference to hemispherectomy. *Brain* 85:427–460.

Belmont, L. and Birch, H.G. 1966. The intellectual profile of retarded readers. *Perceptual and Motor Skills* 22:787–816.

Bennett, G.K., Seashore, H.G., and Wexman, A.G. 1974. *Differential Aptitude Tests.* New York: The Psychological Corporation.

Benton, A.L. 1975. Developmental dyslexia: neurological aspects. *In* W.J. Friedlander (ed.). *Current Reviews of Higher Nervous System Dysfunction.* New York: Raven Press.

Benton, A.L., Varney, N.R., and Hamsher, K. de S. 1978. Lateral differences in tactile direction perception. *Neuropsychologia* 16:109–114.

Bentzen, F. 1963. Sex ratios in learning and behavior disorders. *American J. of Orthopsychiatry* 33:92–98.

Blinkov, S.M. and Glezer, I.I. 1968. *The Human Brain in Figures and Tables.* New York: Basic Books.

Bowd, A.D. 1976. Absence of sex differences on the children's embedded figures test. *Perceptual and Motor Skills* 43:729–730.

Bradshaw, J.L., Gates, A., and Nettleton, N.C. 1977. Bihemispheric involvement in lexical decisions: handedness and a possible sex difference. *Neuropsychologia* 15:277–286.

Bryden, M.P. 1978. Evidence for sex differences in cerebral organization. *In* M.A. Wittig and A.D. Petersen (eds.). *Sex-Related Differences in Cognitive Functioning: Developmental Issues.* New York: Academic Press.

Buffery, A.W.H. and Gray, J.A. 1972. Sex differences in the development of spatial and linguistic skills. *In* C. Ounsted and D.C. Taylor (eds.). *Gender Differences: Their Ontogeny and Significance.* London: Churchill Livingstone.

Coates, S. 1974. Sex differences in field independence among preschool children. *In* R.C. Friedman, R.M. Richart, R.L. Van de Wiele, and L.O. Stern (eds.). *Sex Differences in Behavior.* New York: John Wiley and Sons.

Davidoff, J.B. 1977. Hemispheric differences in dot detection. *Cortex* 13:434–444.

Dennis, M. and Whitaker, H.A. 1976. Language acquisition following hemidecortication: linguistic superiority of the left over right hemisphere. *Brain and Language* 3:404–433.

Duane, D.D. 1977. Perspectives of dyslexia: diagnostic implications. *Psychiatric Annuals* 7: 4–10.

Fairweather, H. 1976. Sex differences in cognition. *Cognition* 4:231–280.

Garai, J.E. and Scheinfeld, A. 1968. Sex differences in mental and behavioral traits. *Genetic Psychology Monographs* 77:169–299.

Gates, A.I. 1961. Sex differences in reading ability. *Elementary School J.* 61:431–434.

Geschwind, N. and Levitsky, W. 1968. Human brain: left-right asymmetries in temporal speech region. *Science* 161:186–187.

Guilford, J.P. 1967. *The Nature of Human Intelligence.* New York: McGraw-Hill.

Hannay, H.J. and Malone, D.R. 1976. Visual field recognition memory for right-handed females as a function of familial handedness. *Cortex* 12:41–48.

Hier, D.B., LeMay, M., Rosenberger, P.B., and Perlo, V.P. 1978. Developmental dyslexia: evidence for a sub-group with a reversal of cerebral asymmetry. *Archives of Neurology* 35: 90–92.

Hieronymus, A.N. and Lindquist, F.F. 1974. *Manual for Administrators, Supervisors, and Counselors: Iowa Tests for Basic Skills.* Boston: Houghton Mifflin.

Hobson, J.R. 1947. Sex differences in primary mental abilities. *J. of Educational Research* 41:126–132.

Kelly, J.T. and Kelly, G.N. 1977. Perception of horizontality by male and female college students. *Perceptual and Motor Skills* 44:724–726.

Kimura, D. 1969. Spatial localization in left and right visual fields. *Canadian J. of Psychology* 23:445–458.

Keogh, B.K. 1971. Pattern copying under three conditions of an expanded spatial field. *Developmental Psychology* 4:25–31.

Kurtzke, J. F. and Kurland, L. T. 1973. The epidemiology of neurologic disease. *In* A. B. Baker and L.H. Baker (eds.). *Clinical Neurology.* Chapter 48. New York: Harper and Row.

Lake, D.A. and Bryden, M.D. 1976. Handedness and sex differences in hemispheric asymmetry. *Brain and Language* 3:266–282.

Lansdell, H. 1961. The effects of neurosurgery on a test of proverbs. *American Psychologist* 16:448.

Lansdell, H. 1962. A sex difference in effect of temporal lobe neurosurgery on design preference. *Nature* 194:852–854.

Lansdell, H. 1973. Effect of neurosurgery on the ability to identify popular word associations. *J. of Abnormal Psychology* 81:255–258.

Levy, J. 1972. Lateral specialization of the human brain: behavioral manifestations and possible evolutionary basis. *In* J.A. Kiger (ed.). *The Biology of Behavior.* Corvallis: Oregon State University Press.

Lord, F. E. 1941. A study of spatial orientation in children. *J. of Educational Research* 34:481–505.

Lovell, K., Shapton, D., and Warren, N.S. 1964. A study of some cognitive and other disabilities in backward readers of average intelligence as assessed by a non-verbal test. *British J. of Educational Psychology* 34:58–64.

Maccoby, E.E. and Jacklin, C.N. 1974. *The Psychology of Sex Differences.* Stanford, California: Stanford University Press.

McGlone, J. 1978. Sex differences in functional brain asymmetry. *Cortex* 14:122–128.

McGlone, J. and Davidson, W. 1973. The relation between cerebral speech laterality and spatial ability with special reference to sex and hand preference. *Neuropsychologia* 11:105–113.

McGlone, J. and Kertesz, A. 1973. Sex differences in cerebral processing of visuo-spatial tasks. *Cortex* 9:313–320.

Milisen, R. 1971. The incidence of speech disorders. *In* L.E. Travis (ed.). *Handbook of Speech Pathology and Audiology.* New York: Appleton-Century-Crofts.

Moore, T. 1967. Language and intelligence: a longitudinal study of the first eight years. *Human Development* 10:88–106.

Morely, M.E. 1965. *The Development and Disorders of Speech in Childhood.* Edinburgh: Livingstone.

Morgan, W.P. 1896. A case of congenital word-blindness. *British Medical J.* 2:1378.

Naidoo, S. 1972. *Specific Dyslexia.* New York: Wiley.

Oltman, P.K., Ehrlichman, H., and Cox, P.W. 1977. Field independence and laterality in the perception of faces. *Perceptual and Motor Skills* 45:255–260.

Orton, S.T. 1937. *Reading, Writing and Speech Problems in Children.* New York: Norton.

Pizzamiglio, L. 1974. Handedness, ear-preference, and field dependence. *Perceptual and Motor Skills* 38:700–702.

Porteus, S.D. 1965. *Porteus Maze Test: Forty Years' Application.* Palo Alto, California: Pacific Books.

Prescott, G.A. 1955. Sex differences in Metropolitan Readiness Test results. *J. of Educational Research* 48:605–610.

Rizzolatti, G. and Buchtel, H.A. 1977. Hemispheric superiority in reaction time to faces: a sex difference. *Cortex* 13:300–305.

Sasanuma, S. and Kobayashi, Y. 1978. Tachistoscopic recognition of line orientation. *Neuropsychologia* 16:239–242.

Stevenson, J. and Richman, N. 1976. The prevalence of language delay in a population of three-year-old children and its association with general retardation. *Developmental Medicine and Child Neurology* 18:431–441.

Stroud, J.B. and Lindquist, E.F. 1942. Sex differences in achievement in elementary and secondary schools. *J. of Educational Psychology* 33:657–667.

Templin, M.C. 1957. *Certain Language Skills in Children.* Minneapolis: University of Minnesota Press.

Treffert, D.A. 1970. Epidemiology of infantile autism. *Archives of General Psychiatry* 22:431–438.

Trites, R.L. and Fedorowicz, C. 1976. Follow-up study of children with specific (or primary) reading disability. *In* R.M. Knights and D.J. Bakker (eds.). *The Neuropsychology of Learning Disorders: Theoretical Approaches.* Baltimore: University Park Press.

Tucker, D.M. 1976. Sex differences in hemispheric specialization for synthetic visuo-spatial functions. *Neuropsychologia* 14:447–454.

Wada, J.A., Clark. R.A., and Hamm, A. 1975. Cerebral hemispheric asymmetry in humans. *Archives of Neurology* 32:239–246.

Warrington, E.K. 1967. The incidence of verbal disability associated with retardation. *Neuropsychologia* 5:175–179.

Witelson, S.F. 1976. Sex and the single hemisphere: specialization of the right hemisphere for spatial processing. *Science* 193:425–427.

Witkin, H.A., Oltman, P.K., Raskin, E., and Karp, S.A. 1971. *A Manual for the Embedded Figures Test.* Palo Alto, California: Consulting Psychologists Press.

Zoccolotti, P. and Oltman, P.D. 1978. Field dependence and lateralization of verbal and configurational processing. *Cortex* 14:155–163.

Hemispheric Differences and Reading Strategies: Two Dyslexias?

Dirk J. Bakker, Ph.D.

Paedologisch Instituut
Amsterdam, Netherlands.

Two Brains

Man has two great brains, a left and a right one, with the corpus callosum, the large commissure, connecting them. These brains—or cerebral hemispheres—are functionally, physiologically, and anatomically different. The results of strokes exemplify functional differences: a left-sided lesion may cause severe language problems while a right-sided lesion usually does not.

Evidence for Physiological Differences

For a time, only functional right-left differences could be shown. With the introduction of modern EEG apparatus, however, the hemispheres were shown to differ physiologically; the electric potentials evoked by speech stimuli, for instance, may be different depending on the side of diversion (Molfese, Freeman, and Palermo 1975). In addition, it recently has been shown that the two brains are anatomically different. An area called planum temporale mostly shows larger extension in the left than in the right temporal lobe, a difference which possibly underlies hemispheric asymmetry in speech reception and production (Geschwind 1972, 1978).*

Functional Differences

The functional asymmetries of the cerebral hemispheres are largely reflected in perceptual asymmetries. Dichotic listening and visual hemi-

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*See also N. Geschwind, Asymmetries of the Brain: New Developments, p.00. *Editor.*

field techniques are currently applied to explore right-left differences in audition and vision.

Perceptual Asymmetries. In dichotic listening, the ears are simultaneously presented with different bits of information via stereo earphones. For instance, the left ear hears *two* and the right ear at the same time hears *five*. Usually three or four pairs are presented per trial, at a rate of two pairs per second. Verbal information presented to the right ear is mostly better recalled than similar information presented to the left ear. The reverse holds for nonverbal information such as environmental sounds and bits of music. Similar asymmetries are found in visual half-field studies. Thus verbal and nonverbal stimuli are best recalled if presented in the right and left visual field respectively.

There is evidence indeed that perceptual asymmetries are less dependent on the verbal or nonverbal nature of the stimuli than on the way such information is processed. The left hemisphere seems most appropriate for the analytic processing of information and the right hemisphere for holistic processing (Bogen 1969; Bever 1975).

The neurological mechanism underlying the asymmetries is the largely contralateral projection of the ears and visual hemifields. Thus verbal information, presented in the right visual field, is relayed directly to the occipital lobe of the left hemisphere. This hemisphere usually controls spoken and written language. Verbal information presented in the left visual field reaches the left hemisphere via the right one. This detour takes time and may cause loss of information. Right field perception of verbal stimuli will be more accurate consequently than left field perception. Similar mechanisms are thought to underlie auditory asymmetries in dichotic listening.

Reliability of Tests for Hemispheric Asymmetries. The utility of dichotic listening and visual half-field tests depends, of course, on their reliability as well as their validity. Reports on the reliability of dichotic ear differences are currently available. Split-half and test-retest reliability coefficients appear to range from .70 to .85 for digits and consonants in both adults and children (Bakker, Van der Vlugt, and Claushuis 1978).

Validity is the extent to which a test measures what it is intended to measure. The validity of perceptual asymmetry concerns the question of how far this variable taps hemispheric asymmetry of function. The most appropriate way to estimate the validity of a test is to analyse the test scores in relation to an external criterion. Kimura (1967) and recently Wada and Gaddes (Gaddes 1978) related observed ear advantages to the outcomes of unilateral intracarotid sodium amytal injections, viz., the temporary loss of hemispheric functions. For most patients they found right-ear advantage and left-ear advantage associated respectively with left and right hemispheric control of speech.

However, such an independent criterion for the locus of function control is not available for normal subjects. One way to approach this problem is to investigate lateral differences in the electrophysiological parameters of the cortex in normal subjects and to examine these differences in relation to ear asymmetries. Such relations were found in a current investigation with college students (Kok, Van de Vijver, Bakker, and Bouma 1979).

In summary, perceptual laterality tests, especially dichotic digit tests, may be considered reasonably reliable instruments to measure hemispheric asymmetries. Psychological, physiological and anatomical studies show these asymmetries to be present in adults as well as in children. Thus the two brains appear to differ in both sub- and super-structures.

Two Reading Strategies

The left and right hemispheres are the primary mediators of verbal-linguistic and spatio-perceptual functions respectively. If reading and learning to read were pure linguistic processes, one could doubt the primary impact of the right hemisphere on progress in reading. However, spatio-perceptual analysis is inherent in the processing of written language. Thus, the non-linguistic right hemisphere may primarily contribute to the processing of text.

Hemispheric Processing of Written Language

Recent investigations with brain-injured and normal adults show the primary involvement of the right brain in the processing of visually perceived letters and words. Faglioni, Scotti, and Spinnler (1969) presented printed letters to patients with lesions of either the right or left cerebral hemisphere. A letter on top of a card had to be matched with one out of ten alternatives. Half of the top letters were printed in a conventional way; the others were masked by sifting out parts of them. The authors of this study report that the patients with right-hemisphere lesions did better than those with left-hemisphere lesions in matching the conventional letters but worse in matching the masked letters, an indication that the contribution of the right hemisphere is critical to the identification of perceptually complicated script.

Participation of the Right Hemisphere. The results of recent visual half-field studies with normal individuals indicate primary participation of the right hemisphere in the identification of normally printed letters (Gibson, Dimond, and Gazzaniga 1972); gothic and binary digits (Gordon and Carmon 1976); concrete words (Ellis and Shepherd 1974); kanji script (Sasanuma, Itoh, Nori, and Kobayashi 1977 and Hatta 1977); and non-conventional typefaces (Bryden and Allard 1976). Bryden and Allard flashed different typefaces in the right and left visual field and looked into the field preference by type interaction. They found that conventional letters were recalled better if presented in the right field and non-conventional letters were recalled better if presented in the left field. The non-conventional typefaces were perceptually demanding and difficult to identify. The right hemisphere seems to be the primary processor of such letters. The conclusion seems warranted, therefore, that adult readers generate right hemispheric strategies for the primary analysis of non-conventional and perceptually loaded script.

Right Hemisphere Strategy in Children Learning to Read. What holds for fluent readers may hold for children learning to read, as well. Thus children, like adults, may call in right hemispheric strategies to process non-conventional script. Tricks are not needed, however, to make conventional script non-conventional for young children. All writing is new and, in view of the many shapes, perceptually complex for them. As a consequence, they will process text *primarily* with their right hemisphere.

Indeed, there is evidence that young children do process text primarily with the right hemisphere. Reitsma (1975), while presenting three-letter words to either the right or left visual field of second-, fourth- and sixth-grade boys and girls, found a significant grade-by-field interaction which indicated right-field superiority at grades four and six but not at grade two. Reitsma argues that the absence of a field difference in second graders is possibly due to visuo-spatial analysis being prominent in word recognition at early stages of the learning-to-read process. His findings parallel those of Miller and Turner (1973) who found right-field superiority for the recognition of words in fourth-grade and older children only. More recently Carmon, Nachshon and Starinsky (1976), in presenting script to normal first, third, fifth and seventh graders, showed primarily right hemispheric processing of letters in the children at the lower grades.

Results of investigations on the development of visual field asymmetry suggest, in summary, that the identification of flashed letters and words is primarily controlled by the right and left cerebral hemisphere at respectively younger and older primary school ages.

Hemispheric Strategies and Reading Stages. The differential hemispheric involvement may parallel the distinctive nature of the successive stages in learning to read (Bakker 1979a). Fries (1963), in discussing such stages, holds that "learning to read means developing a considerable range of high-speed recognition responses to specific sets of patterns of graphic shapes" (p. xv) and that later on these responses become automatic habits "such that the graphic shapes themselves sink below the threshold of attention" (p. 132). Frank Smith (1971) states that the bridge between surface structure and meaning is crossed from the side of the surface structure in early reading and from the side of meaning in fluent reading. Thus the novice, in contrast to the experienced reader, seems to invest much of the effort in spatio-perceptual analysis. Depending upon whether perceptual analysis or the processing of syntax and meaning is prominent, reading could be controlled primarily by either the right or left hemisphere. The evidence reviewed suggests that readers who are faced with perceptually demanding script will rely on right hemispheric strategies to process that script.

Right Hemispheric Mediations of Speech and Oral Reading. Individuals who have *speech* mediated by the right hemisphere may also use that hemisphere for processing script. Since speech is an intrinsic aspect of reading aloud, those who show right and those who show left hemispheric representation of speech should consequently be indistinguishable by the way they read. To test this hypothesis, Bakker, Teunissen, and Bosch (1976) presented a word-matching task to normal children who showed right-ear advantage on a dichotic digit test and to those who showed left-ear advantage. The task required the child to match a word with partially sifted out letters to one of three properly printed words. Children who showed left-ear dominance were matched with others who showed right-ear dominance on reading *proficiency*, that is, on the number of words matched correctly. *Speed and accuracy* of word matching were considered, as well.

Number of words attempted and number of words read wrongly are reflections of speed and accuracy respectively. Each of these measures was standardized across ear advantage and within age groups, and the resulting z-values for speed and accuracy were then individually summed. Low z-values represented low speed-high accuracy and high z-values represented high speed-low accuracy in word matching. As may be seen in Table 1, the left ear dominants, as predicted, demonstrated significantly lower z-values than the right ear dominants. This indicates that the dominance groups, while equally proficient, are different in that the right dominants "read" relatively fast but inaccurately and the left dominants

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Table I. Reading Strategy as a Function of Cerebral Dominance; Positive Values Indicate High Speed—Low Accuracy, Negative Values Indicate Low Speed—High Accuracy (Bakker, Teunissen and Bosch 1976)

	Second Grade	*Fourth Grade*	*Sixth Grade*	*Across Grades*
LEFT HEMISPHERE DOMINANCE (Right ear advantage)	+ .83	+ .37	+ .19	+ .44
RIGHT HEMISPHERE DOMINANCE (Left ear advantage)	− 1.32	− .82	− .55	− .95
t	2.39	1.30	.55	2.47
df	11	14	10	39
p (1-tailed)	< .025	> .10	> .25	< .01

relatively slowly but accurately. The between-group difference in reading strategy decreased with increasing age.

The results thus suggest that the reading which is primarily mediated by the right hemisphere is qualitatively different from the reading which is primarily controlled by the left hemisphere. Left and right hemispheric reading strategies are characterized by speed and accuracy respectively.

Another investigation was concerned with the possible reflections of these strategies in the types of errors made. A four-pair dichotic digit test and pieces of text, sampled from reading books, were presented to normal second- and fifth-grade children, randomly sampled from their classes (Bakker 1979b). Retesting after one week on both dichotic listening and reading revealed satisfactory high reliabilities (Bakker, Van der Vlugt, and Claushuis 1978). The subjects who showed right-ear advantage on test and retest were considered consistent right-ear dominants. Consistent left-ear dominants were selected similarly. Reading was taped and errors were classified either as *substantive* or *time-consuming* errors. Omission of a word, omission of letters, adding of or replacement by a new word, inversion of words or letters, and miscellaneous mistakes were all classified as substantive errors. Time-consuming errors were as follows: correction of a missing word, correction of omitted letters, word spelling plus correction, stuttering plus correction, repetition of words, correction of misreading, wrong emphasis or pronunciation plus correction, correction of replacement by other words. Thus the ultimate result of a time-consuming error is a correct response while a substantive error ultimately results in an incorrect response.

Table II. Mean Reading Error by Type and Ear Dominance

	Second Grade		*Fifth Grade*		*Across Grades*	
	Right Eared Ss (N = 35)	*Left Eared Ss (N = 7)*	*Right Eared Ss (N = 24)*	*Left Eared Ss (N = 8)*	*Right Eared Ss (N = 59)*	*Left Eared Ss (N = 15)*
Across Types	25.5	27.6	22.4	29.3	24.3	28.5
Substantive	13.9	10.3	10.0	11.0	12.4	10.7
Time-consuming	11.6	17.3	12.4	18.3	11.9	17.8
Difference	+ 2.3	− 7.0	− 2.4	− 7.3	+ .5	− 7.1
z	1.65		1.83		2.56	
p (one-tailed)	< .05		< .05		< .01	

From D. J. Bakker, J. Teunissen, and J. Bosch, Development of laterality-reading patterns. *In* R. M. Knights and D. J. Bakker (eds.), *The Neuropsychology of Learning Disorders.* Baltimore: University Park Press. © 1976. University Park Press. Reprinted by permission.

Table 2 shows that consistent left-ear dominants make less substantive and more time-consuming errors than consistent right-ear dominants. Left-ear dominants may rely on right hemispheric reading strategies. These readers are sensitive for the perceptual features of script which they tend to analyse carefully. As a consequence, their reading proceeds slowly but accurately; they make few substantive errors and, if they do, they tend to correct them, which of course is time-consuming. Right-ear dominants, on the other hand, may rely on left hemispheric strategies. While primarily trying to read for meaning, they tend to overlook the perceptual features of the text. As a consequence, their reading may be fast but inaccurate.

In summary, the right and the left brain both possess the capacity for the primary control of reading behavior. The generation of either right or left hemispheric strategies depends on external as well as internal factors. Perceptually demanding script (an external factor) could release right hemispheric strategies, as it might (internally) a right and, possibly, a bilateral representation of speech. Conventional script and left-brain control of speech, on the other hand, may enhance left hemispheric control of reading. Left and right brained reading are qualitatively different in terms of speed, accuracy and types of errors.

Two Dyslexias

All script is novel and perceptually demanding for children entering the primary school. The ability to control reading primarily with their right hemisphere would bring grist to these children's mill, all the more so because accuracy of reading is stressed and slowness accepted, at least in the lower grades. Children in the lower grades who show right or bilateral control of *speech* thus seem privileged since they tend to generate right hemispheric reading strategies.

However, the ultimate aim of learning to read is *fluency*, that is, speed *and* accuracy. Right hemispheric strategies seem inappropriate for fluency. Although left hemispheric strategies are appropriate, the left brain would set to work smoothly only with conventional script. Its strategies would thus be profitable in advanced stages of the learning-to-read process. Children, at these stages, are privileged by having *speech* mediated by the left hemisphere since such a cerebral organization of spoken language would promote a predominantly left hemispheric control of reading.

The novice reader, faced with novel graphemic shapes, and the advanced reader, faced with conventional script, could best rely on spatio-perceptual and syntactic-semantic strategies respectively. Spatio-perceptual strategies are usually mediated by the right hemisphere; syntactic-semantic ones by the left hemisphere. Having speech controlled by the right or left brain, moreover, would ease the generation of right and left hemispheric reading strategies respectively. This model would predict that right hemispheric control of speech at an early age, as well as left hemispheric control at later ages are appropriate bases for subsequent reading proficiency.

Reliability of Predictions

These predictions were investigated in two longitudinal samples. The subjects of the first sample were presented a four-pair dichotic digit test at kindergarten school and both at the start and at the end of grade one. A standard reading test was administered at the end of grade five.

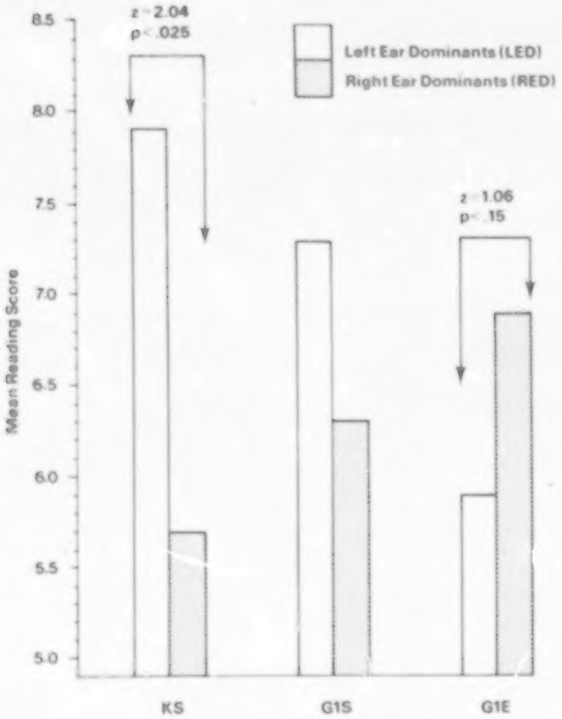

Figure 1. Fifth-grade reading performance in relation to ear dominance at Kindergarten School (KS), Grade 1 Start (G1S) and Grade 1 End (G1E).

A preliminary analysis of the results in Figure 1 indicated that children who showed left-ear advantage at kindergarten age read better at grade five than children who showed right-ear advantage. Children who showed left-ear advantage at the end of the first grade, on the contrary, tended to read worse in grade five than those who showed right-ear advantage. From this outcome one may predict that children who shift from left-ear advantage at kindergarten age to right-ear advantage one year later are the best fifth-grade readers and that children shifting in the reverse direction are the worst readers of grade five (Figure 2).

These predictions were verified in a second study. Children of the second longitudinal sample were presented with the same dichotic

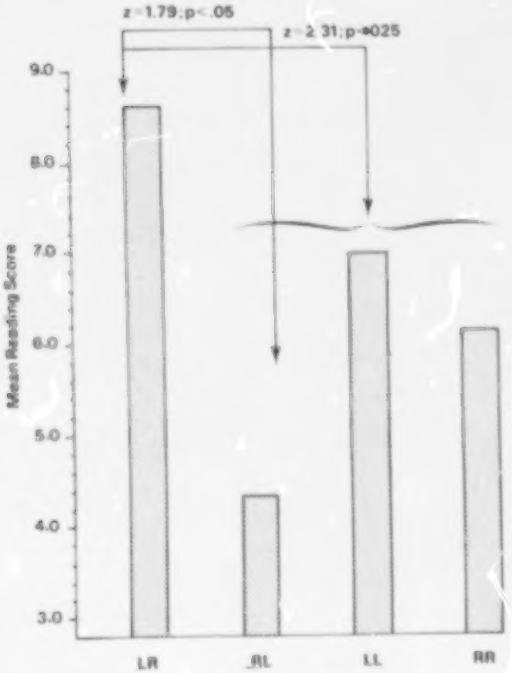

Figure 2. Fifth-grade reading performance in shifters and non-shifters of ear advantage (LR = Left-Right shift; RL = Right-Left shift; LL = non-shifting left-eared subjects; RR = non-shifting right-eared subjects).

listening test in grades one and two, while the standard reading test was administered at grade six. The results supported the findings of the first sample.

Hemispheric Strategies and Two Types of Dyslexia

The application of spatio-perceptual strategies at the onset of reading may thus be facilitated, but not necessarily conditioned, by having speech mediated in the right hemisphere. The use of syntactic-semantic strategies later on may similarly be facilitated, but not necessarily conditioned, by a left cerebral control of speech. Children who have reading difficulty could be either those who apply syntactic-semantic strategies from the very onset of the learning-to-read process, thus skipping the period of spatio-perceptual analysis (dyslexia—type I), or those who apply spatio-perceptual strategies at reading onset but who do so too emphatically and for too long a period, thus neglecting the spatio-perceptual to syntactic-semantic shift (dyslexia—type II). One would predict type I dyslexics to have speech mediated by the left hemisphere, for left hemispheric speech representation would facilitate the early application of syntactic-semantic strategies. These dyslexics will consequently be relatively fast but inaccurate readers. Type II dyslexics, on the contrary, would have speech mediated by the right hemisphere, thus facilitating the generation of spatio-perceptual reading strategies. These will consequently be relatively slow but accurate readers. One may note that the two dyslexias are the phenotypical equivalents of normal readers who predominantly use either a spatio-perceptual or a syntactic-semantic strategy.

Dyslexics and normals may differ, however, in that normal readers adapt to the appropriate reading strategy in time while disturbed readers do not. Thus type I dyslexics may be premature in applying syntactic-semantic strategies while type II dyslexics are possibly too tenacious in the application of spatio-perceptual strategies. The predilection for the syntactic-semantic approach in type I may be due to the spatio-perceptual system being relatively underdeveloped. This could reflect a poor lateralization of the system at the cerebral level of functioning. On the other hand, the type II preference for spatio-perceptual priming suggests that the system is overdeveloped. Possibly this parallels a firm cerebral lateralization of functions. Type I and type II dyslexics are consequently predicted to show weak and firm hemispheric specialization of visuo-perceptual functions, respectively.

Study of Dyslexia Types I and II Predictions

A recent study in collaboration with Dr. C.K. Leong of the University of Saskatchewan at Saskatoon, Canada, attempted to verify these predictions. Thirty-eight 8 to 12 year old children from two schools for special education, mostly boys, participated in the project. The majority of these children is learning-disturbed with severe or mild reading and spelling problems; others show concentration and/or emotional problems only. All subjects were presented a dichotic digit test. Children who showed left-ear advantage were matched with children showing right-ear advantage on age, sex and, as closely as possible, on degree of ear asymmetry also. Both ear preference groups were retested on dichotic ear asymmetry four weeks later. At that time they were all presented with a word reading test twice, a text reading test, and a nonverbal visual half-field task.*

Scores on the word and text reading tests were the number of errors made. In addition, errors in text reading were classified into one of twelve categories. The visual half-field task provided for two geometrical forms which were projected simultaneously on a white screen, either left or right of the fixation point. Some forms were identical, others different. The subjects were required to say "yes" to identical and "no" to dissimilar forms. Responses were fed into a microphone which was connected with a stopclock to measure the reaction times. Twenty-four trials were randomly presented in each field, 12 identical and 12 different pairs. Presentation time was 100 msec. Left and right field trials were alternated with trials showing the pairs at the fixation point. The latter was done in an effort to control for fixation. It was decided to exclude those subjects from analysis who showed significantly longer reaction times on the central trials than on the lateral trials. No one did, however. A number of children were making more than two mistakes in the "same" ("yes") condition, that is, in responding to identical forms. It was decided, therefore, to consider the results of the "different" ("no") condition only (Figure 3).

Results of the Study. Initially, left-ear dominants (LED) made 2.83 errors on the average in word reading; for initially right-ear dominants (RED), the figure was 6.33. Consistent LEDs, that is, those who showed left-ear advantage on both test and retest made 0.17 errors; consistent REDs, 4.00. In text reading initial LEDs and REDs made respectively 12.9 and 19.7 errors on the average. For consistent LEDs and REDs these figures were 8.3 and 16.4. Thus left-ear dominants made considerably fewer errors in word and text reading than right-ear dominants. (Figure 4.)

A distribution of errors (in percents of total) shows initially REDs making relatively more class 2 plus 8 mistakes than initally LEDs. Class 8 concerns substitution by synonyms; class 2, omissions of letters and syllables. Thus REDs were characterized by perceptual errors and semantic fantasies. LEDs tend to make corrections (class 12) which is time-consuming.

Initially LEDs showed shorter left than right field reaction times on matching geometrical forms. For REDs, however, a field difference could not be shown. Thus left-ear dominant children do show the predicted

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*Also presented was a verbal half-field task which proved to be too difficult.

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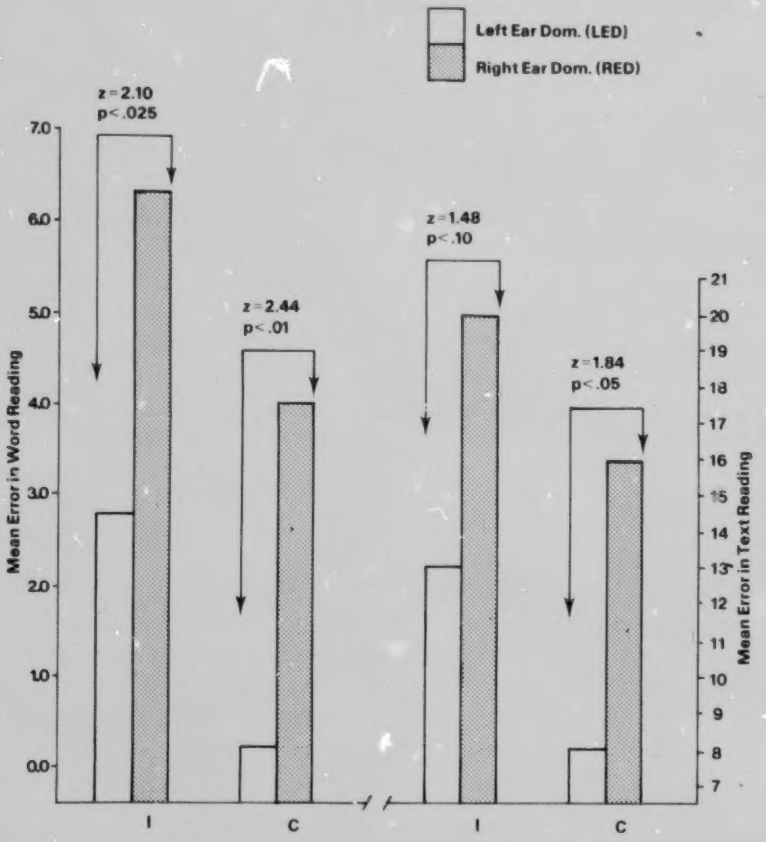

Figure 3. Reading performance by ear dominance (I = initial ear dominance; C = consistent ear dominance).

right hemispheric representation of visual form perception while right-ear dominants do not. (Figure 5)

Left-ear dominants, in contrast to right-ear dominants, are supposed to generate right hemispheric strategies in reading. When left-ear dominants, in addition, show firm right hemispheric specialization for visuo-perceptual functions, one could imagine that these children handle letters the way they handle forms. This hypothesis concerning left ear dominants is supported by the significant correlation (*r.* = + .57; *p* <.025, 1-tailed) between reaction times to centrally perceived geometrical forms and

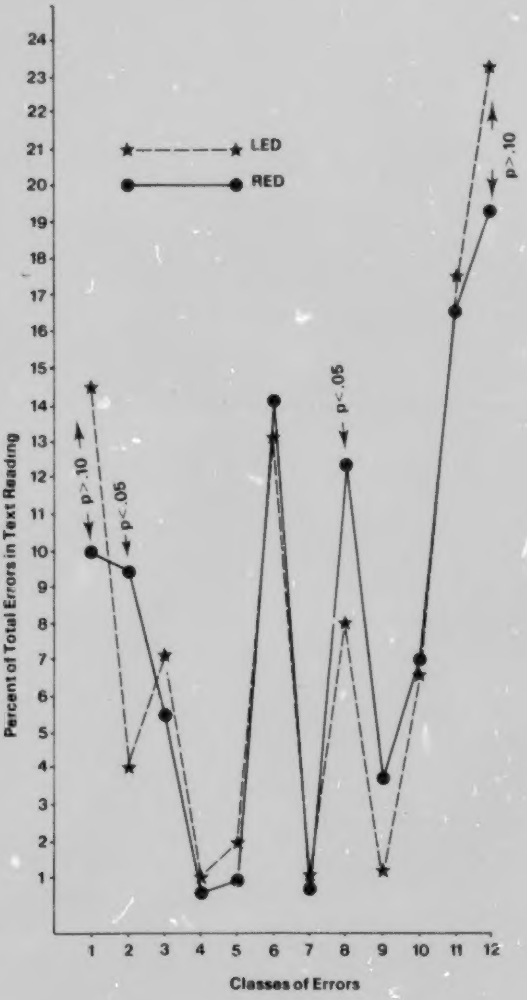

Figure 4. *Type of error by ear dominance (LED = Left-Ear Dominance; RED = Right-Ear Dominance).*

letters. In right-ear dominants, on the other hand, no significant correlation between form and letter perception could be found ($r. = +.30; p > .05$, 1-tailed).

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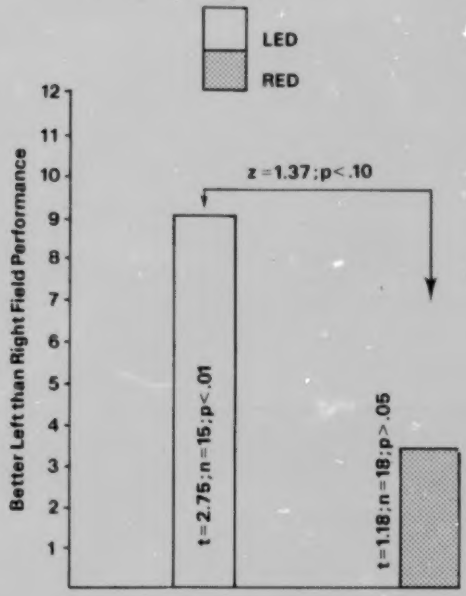

Figure 5. Visual field performance by ear dominance (LED = Left-Ear Dominance; RED = Right-Ear Dominance).

Conclusion

Man possesses two great brains. Each of them is differentially involved in the learning-to-read process. Right hemispheric strategies are appropriate in early reading; left hemispheric strategies in advanced reading. The generation of right hemispheric strategies is facilitated by having speech mediated in the right brain. Left-sided speech control similarly facilitates the release of left hemispheric reading strategies. Left- and right-ear dominants in dichotic listening are characterized by their time-consuming or substantive errors, respectively. Reading problems may originate either from a premature application of syntactic-semantic strategies, usually generated by the left hemisphere (type I dysleixa), or an excessive and persisting application of spatio-perceptual strategies, usually released by the right hemisphere (type II dyslexia). Type I dyslexics were found to show: 1) primarily left hemispheric control of speech; 2) ambivalent hemispheric control of form perception; 3) many reading errors, especially perceptual ones; and 4) noncorrelated form and letter perception. Type II dyslexics were found to show: 1) primarily right hemispheric control of speech; 2) definite right hemispheric control of form perception; 3) time-consuming errors; and 4) correlated form and letter perception.

References

Bakker, D.J. 1979a. Perceptual asymmetries and reading proficiency. *In* M. Bortner (ed.). *Cognitive Growth and Development.* New York: Brunner/Mazel.

Bakker, D.J 1979b. A set of brains for learning to read. *In* K.C. Diller (ed.). *Individual Differences and Universals in Language Learning Aptitude.* Boston: Newbury House Publishers.

Bakker, D.J., Teunissen, J., and Bosch, J. 1976. Development of laterality-reading patterns. *In* R.M. Knights and D.J. Bakker (eds.). *The Neuropsychology of Learning Disorders.* Baltimore: University Park Press.

Bakker, D.J., Van der Vlugt, H., and Claushuis, M. 1978. The reliability of dichotic ear asymmetry in normal children. *Neuropsychologia* 16:753–757.

Bever, T.G. 1975. Cerebral asymmetries in humans are due to the differentiation of two incompatible processes: holistic and analytic. *In* D. Aaronson and R. Rieber (eds.). *Developmental Psycholinguistics and Communication Disorders.* New York: New York Academy of Sciences.

Bogen, J.E. 1969. The other side of the brain II: an appositional mind. *Bull. Los Angeles Neurological Societies* 34:73–105.

Bryden, M.P. and Allard, F. 1976. Visual hemifield differences depend on typeface. *Brain and Language* 3:191–200.

Carmon, A., Nachshon, I., and Starinsky, R. 1976. Developmental aspects of visual hemifield differences in perception of verbal material. *Brain and Language* 3:463–469.

Ellis, H.D. and Sheperd, J.W. 1974. Recognition of abstract and concrete words presented in left and right visual fields. *Exper. Psychol.* 103:1035–1036.

Faglioni, P., Scotti, G., and Spinnler, H. 1969. Impaired recognition of written letters following unilateral hemispheric damage. *Cortex* 5:120–133.

Fries, C.C. 1963. *Linguistics and Reading.* New York: Holt, Rinehart and Winston.

Gaddes, W.H. 1978. *Personal communication.*

Geschwind, N. 1972. Anatomical evolution and the human brain. *Bull. Orton Soc.* 22:7–13.

Geschwind, N. 1978. Newer developments in anatomical asymmetries of the brain. *Paper presented at the Orton Society annual conference.* Minneapolis: November. (Also published in this *Bulletin*, p. 67.)

Gibson, A.R., Dimond, S.J., and Gazzaniga, M.S. 1972. Left field superiority for word matching. *Neuropsychologia* 10:463–466.

Gordon, H.W. and Carmon, A. 1976. Transfer of dominance in speed of verbal response to visually presented stimuli from right to left hemisphere. *Perceptual and Motor Skills* 42:1091–1100.

Hatta, T. 1977. Recognition of Japanese Kanji in the left and right visual fields. *Neuropsychologia* 15:685–688.

Kimura, D. 1967. Functional asymmetry of the brain in dichotic listening. *Cortex* 3:163–178.

Kok, A., Van de Vijver, R., Bakker, D.J., and Bouma, J.M. 1979 Hemispheric asymmetry in slow EEG potentials during verbal dichotic information processing. *Paper presented at the*

2nd. European conference of the International Neuropsychological Society. Noordwijkerhout: June.

Miller, L.K. and Turner, S. 1973. Development of hemifield differences in word recognition. *Educ. Psychol.* 65:172–176.

Molfese, D.L., Freeman, R.B. and Palermo, D.S. 1975. The ontogeny of brain lateralization for speech and non-speech stimuli. *Brain and Language* 2:356–368.

Reitsma, P. 1975. Visual asymmetry in children. *Paper presented at the Boerhaave Conference.* Leyden: July.

Sasanuma, S., Itoh, M., Mori, K., and Kobayashi, Y. 1977. Tachistoscopic recognition of Kana and Kanji words. *Neuropsychologia* 15:547–553.

Smith, F. 1971. *Understanding Reading.* New York: Holt, Rinehart and Winston.

Cerebral Dominance and Subtypes of Developmental Dyslexia

Itzhak Fried

Department of Psychology
University of California/Los Angeles

Introduction

Research on cerebral dominance in developmental dyslexia has not produced clear results, in spite of the use of modern techniques such as bilateral sensory stimulation and recording of brain electrical activity. It is proposed that dyslexic subtypes may possess opposite cerebral dominance patterns. Thus, including different dyslexic subgroups in one "homogeneous" experimental group may cancel out the differences which each subgroup may have with respect to normal readers. When dyslexics are classified into subgroups according to reading-spelling patterns, it can be shown with event-related potential (ERP) techniques that cerebral dominance abnormalities may be present in at least one of the subgroups.

Orton's Hypothesis of Cerebral Dominance

Perhaps the most controversial, yet stimulating, hypothesis in the history of dyslexia research has been Orton's hypothesis that attempted to link reading disability with cerebral dominance. Orton (1937) suggested that failure to establish cerebral dominance is the major factor underlying developmental dyslexia.

The concept of cerebral dominance generally refers to the functional asymmetry of the cerebral hemispheres. Each hemisphere is presumed to be dominant or specialized for certain functions. Based upon studies and observations of human patients over the last century, it is now widely accepted that the left hemisphere is usually dominant for the mediation of

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linguistic information, while the right hemisphere specializes in the processing of nonverbal or visuospatial information. A failure to establish adequate cerebral dominance may mean, therefore, the failure of either left or right hemisphere mechanisms to assume specialization in certain functions, or a failure in interhemispheric integration. Most of the research in the area of developmental dyslexia, however, has focused on left hemisphere mechanisms only. This bias may be explained by the prevalence of the view of reading as a purely linguistic skill or by the frequent association of acquired dyslexia with lesions of areas in the left hemisphere (Critchley 1970).

Since its formulation, Orton's hypothesis has been tested in dyslexic populations in numerous studies, but with no clear-cut results. As we shall see, the failure to test Orton's hypothesis successfully, whether by neuropsychological or electrophysiological techniques, suggests an interaction between cerebral dominance and the typology of developmental dyslexia. Specifically, in order to examine cerebral dominance in dyslexia, one has to make a distinction between subtypes which may possess opposite patterns of cerebral dominance.

Testing of Orton's Hypothesis

Initially, Orton's hypothesis was thought to be supported by clinical evidence of left, mixed or inconsistent handedness, eyedness and footedness in many reading-disabled children (Zangwill 1960). In view of the accepted correlation between handedness and speech lateralization, this evidence indicated a different pattern of brain organization or cerebral dominance in a large percentage of the developmental dyslexic population. Subsequent large studies, however, have often failed to show important differences in lateral preference between normal and retarded readers (Benton 1975).

Recent studies of cerebral dominance in dyslexics have used newly developed techniques to measure hemispheric specialization. These techniques involve selective presentation of information to each cerebral hemisphere, by lateralization of the input to the right or left sensory fields. Often the two hemispheres are put in a competitive situation with respect to a certain task, and the degree of superiority exhibited by one hemisphere (as measured, for instance, by reaction time to the information presented in the corresponding lateral sensory field) is taken to indicate its dominance over the other. For example, the dichotic listening technique often involves the presentation of different verbal and nonverbal stimuli to both ears. More frequent reports of information channeled to one of the ears indicate superiority of the opposite (contralateral) hemisphere for processing that type of information (anatomically, the right ear is more extensively connected to the left auditory cortex than to the right, and vice versa). Corresponding techniques—dichoptic and dichhaptic stimulation—are used in the visual and somatosensory modalities.

Dichotic listening experiments usually show superiority for verbal material in the right ear in normal adults (Kimura 1961) and children of three years and above (Ingram 1975). Interpreted as demonstrating left-hemisphere dominance for speech function, this superiority has been extensively used as a measure of language lateralization. Dichotic listening studies of poor readers, however, do not yield clear-cut results. For example, Bryden (1970) and Zurif and Carson (1970) found that right-ear scores were worse in poor readers as compared to good readers, while a study by Yeni-Komshian et al. (1975) reported data in the opposite direction.

Results with dichoptic stimulus presentation have indicated that in most normal adults verbal material is more readily identified in the right visual field, while nonverbal material is more readily identified in the left visual field (Kimura 1966). Again results for poor readers are not clear. Olson (1973) found that heterogeneous delayed readers and good readers showed right visual field superiority for word recognition with no differences between the groups, although a subgroup of young delayed readers without known physical, intellectual, emotional, or cultural deficiencies, failed to show any field superiority. Another study (Yeni-Komshian et al. 1975) showed right visual field superiority for digital stimuli to be greater for poor readers than for good readers. In fact, the poor readers performed poorly at left visual field presentations, thus yielding a relatively high degree of right (as compared to left) visual field superiority. The authors suggest that poor readers suffer from some form of degraded processing in the right hemisphere, or degraded right to left hemisphere transmission.

These few examples demonstrate that, even with modern techniques, the status of cerebral dominance in developmental dyslexia is not clear. Recently, Witelson (1977), presenting subjects with two different shapes simultaneously, one to each hand (dichhaptic stimulation), found greater left than right accuracy in normal readers, but no lateral differences in dyslexic children. Witelson concludes that this lack of asymmetry suggests bilateral processing of spatial information in dyslexics.

Electroencephalography, Cerebral Dominance, and Developmental Dyslexia

There are two main electrophysiological, noninvasive techniques that can be used to probe hemispheric specialization. The first technique involves the recording (at sites on the surface of the scalp) of the ongoing electroencephalographic (EEG) activity. In the typical hemispheric specialization paradigm, recording is done while the subject is performing tasks that are presumed to engage the two hemispheres differentially. The degree of hemispheric engagement or utilization is then assumed to be reflected in certain variables of the EEG, most commonly variables in the frequency domain. Such studies have been carried out with different verbal and nonverbal or visuospatial tasks (Galin and Ornstein 1972; Doyle et al. 1974; Morgan et al. 1974; and others). The second technique involves the recording of electrical potentials that are evoked by, or related to, discrete sensory events. The term used for this technique is *Evoked Response* or *Event Related Potential* (ERP). Depending on the sensory modality of the stimuli, we have auditory, visual, and somatosensory evoked response (AER, VER, SER).

A large number of studies have used the ERP technique to investigate cerebral dominance. The most common paradigm involves the recording of potentials during verbal and nonverbal stimulation and the comparison of potentials recorded at left hemisphere versus right hemisphere sites. Detecting such differences involves looking at different parameters of the electrical waves, such as amplitudes and latencies of components, waveforms, and frequencies. For a comprehensive and critical review of ERP studies of hemispheric specialization, the reader is referred to Donchin et al. (1977) and Friedman et al. (1975). Both reviews criticize many of the studies of evoked potential correlates of hemispheric specialization on grounds of design flaws, data measurement, data analysis and inconsistencies in reported findings.

The electroencephalographic approach to hemispheric specialization is based on the theory of localization of function. According to this theory, space coordinates are assigned to mental functions. Different structures or areas in the brain are assumed to mediate different functions. The distribution of the scalp-recorded electrical activity is assumed to reflect the distribution of functions in the areas that underlie the recording sites. Generalized to whole hemispheres, the theory of localization of function becomes a theory of hemispheric specialization and thus would predict that during the performance of a lateralized task, the distribution of electrical activity would also be lateralized (i.e., be asymmetric with respect to left and right recording sites). In fact, one can use the EEG to obtain a more refined picture of the distribution of functions not only between hemispheres but also within one hemisphere. Electroencephalography may thus be a more refined tool than the bilateral sensory stimulation techniques (dichotic listening, dichoptic, and dichhaptic stimulation) in probing brain mechanisms of cognitive functions. It is thus surprising that only a relatively small number of studies have used electroencephalographic techniques to address the question of cerebral dominance and localization of function in developmental dyslexia.

There are several reports of EEG abnormalities in dyslexics (see Benton 1975, for a review), but none of these concerns itself specifically with the problem of hemispheric differences. In one of these studies, Sklar et al. (1973) found some prominent differences in the EEG spectra of dyslexic children as compared to normal readers. Most interestingly, during a reading task, coherence in activity between leads of the same hemisphere was higher in dyslexics than in normal children. However, the coherence of the electrical activity between symmetrical sites (with respect to midline) in the left and the right hemisphere tended to be higher in normals. This result may be interpreted as demonstrating relatively poor interhemispheric synchronization in dyslexics. It is not clear, however, how this deficit would relate to reading, especially in the absence of evidence of acquired dyslexia in cases where the interhemispheric connections are impaired.

A few studies have used evoked response procedures to study hemispheric functioning in reading-disabled children. Conners (1971) found attenuation of amplitude of the visual evoked response (VER) to flashing lights in the left parietal region in poor readers. This attenuation was significant for the negative component of the response approximately 200 msec following stimulus onset. Preston et al. (1974) found significantly smaller amplitude in the negative wave at 180 msec following onset of verbal and nonverbal stimuli recorded over the left angular gyrus of disabled readers, compared to two control groups (one matched for age and IQ and one matched for reading level and IQ). These results have been interpreted as suggesting a deficit in the information relayed through the angular gyrus. Sobotka and May (1977) report hemispheric asymmetry in amplitude of VER in dyslexic children (right bigger than left). They also, however, found this asymmetry in normals. Interestingly, VER amplitudes were found to be greater for dyslexics. This result is in agreement with the findings of Buchsbaum and Wender (1973), but is in contrast to findings by Conners (1971). Sobotka and May conclude that VER amplitude *per se* may not be a reliable correlate of dyslexia. Indeed, interhemispheric asymmetries in amplitude may be due to trivial factors, such as skull thickness, and may not be related at all to cerebral dominance. For instance, we have found AER (auditory evoked response) amplitudes to be higher on the right than on the left, regardless of the nature of the stimulus (words or musical chords) or the classification (dyslexic or normal) of the subject (Fried et al. 1979).

In order to be able to better interpret hemispheric differences in variables of the evoked response, the experimenter would do better to include several types of stimulus which effect the hemispheres differentially. An interaction between the type of stimulus and the side of recording may then be an indicator of hemispheric specialization. Preston et al. (1977) used two types of stimulus (words and flashes) and found a larger difference between the evoked response to these stimuli at a left parietal site for normals compared to disabled adult readers (i.e., a significant group × hemisphere × stimulus interaction). The difference between the responses to words and flashes reflect, according to these authors, the additional processing involved in the verbal task. This additional processing may be impaired in the disabled readers, thus yielding smaller word-flash differences.

In summary, the number of electroencephalographic studies which address the question of cerebral dominance in developmental dyslexia is small. However, with improvements in stimulus choice, data analysis and *other methodological aspects* (Friedman et al. 1975), the electroencephalographic approach, and especially evoked response techniques which provide the brain with a discrete active challenge, may prove to be a useful tool in probing hemispheric specialization in dyslexia. I shall now proceed to focus on one of these methodological aspects: the selection and classification of dyslexic subjects.

A Major Methodological Problem: Cerebral Dominance and Dyslexic Subtypes

Subject selection is one of the major problems in nearly all of the studies of neural correlates of dyslexia. The subjects are usually selected according to variously quantified delays in their reading level, or worse, according to different criteria of learning disability. More importantly, subjects are treated as a *homogeneous,* dyslexic group. Thus, children with different types of reading problems are aggregated into one group. In this respect, research for neural correlates of dyslexia is often far behind the clinical picture. The realization that dyslexia is not a unitary dysfunction is not new. For instance, Myklebust (1965) has delineated auditory and visual dyslexia. Kinsbourne and Warrington (1966) described two groups of backward readers: one is impaired in language skills, while the other is impaired in sequential ordering. Ingram et al. (1970) described three subgroups of dyslexia, identified according to typical reading errors: audiophonic (failure to appreciate the phonic value of letters), visuospatial (faulty visual discrimination of different words), and mixed. Boder (1971) proposed three subtypes based on reading-spelling patterns: dysphonetic dyslexia, dyseidetic dyslexia, and mixed dysphonetic-dyseidetic dyslexia. According to Boder, the dysphonetic child has a primary deficit in symbol-sound (grapheme-phoneme) integration resulting in an inability to analyze or synthesize words phonetically. The dyseidetic child has a primary deficit in the ability to perceive letters or whole words as configurations or visual gestalts. The mixed dyseidetic-dysphonetic child (alexic) has both deficits. Boder's classification shares similarities with Ingram's classification, and is also similar to later classifications, such as the distinction between visual errors, grapheme-phoneme errors and syntactico-semantic errors (Marshal and Newcombe 1973), or Pirozzolo's distinction between auditory-linguistic dyslexia and visuospatial dyslexia (Pirozzolo 1978).

The major appeal of Boder's classification and similar typologies of dyslexia to cerebral dominance research is in their relationship to current conceptualizations of the differences between the two hemispheres. Modern views of hemispheric specialization attempt to go beyond the verbal-nonverbal dichotomy and portray the left hemisphere as a sequential, analytic processor of information. The right hemisphere is portrayed as specializing in holistic, "in parallel" information processing (Levy and Sperry 1968; Dimond and Beaumont 1974). One can argue that reading depends on cognitive strategies present not only in the verbal left hemisphere but in both hemispheres. The ability to analyze words into their components (phonemes, syllables, letters) may depend on the left hemisphere, while the perception of whole word configurations or gestalts may represent a right hemisphere strategy. In this respect the dysphonetic dyslexics with their inability to process words phonetically, may exhibit failure of left hemisphere mechanisms, while dyseidetic children who lack the ability to perceive the gestalt of letters and words may lack adequate right hemisphere mechanisms. Indeed, the view of reading as a skill involving the right as well as left hemisphere is supported by cases of acquired dyslexia with right-hemisphere lesions which disturb visuo-

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spatial processing (Pirozzolo 1978) and by research in split-brain patients which suggests that the right hemisphere has some verbal skills (Zaidel 1978).

If indeed different dyslexic types possess opposite cerebral dominance patterns, then including them together in one experimental group in a study of cerebral dominance may cancel out the differences which each subgroup may have with respect to normal readers. The question of the typology of dyslexia is therefore intimately related to the problem of cerebral dominance and is thus crucial to the testing of Orton's hypothesis.

Auditory Event Related Study of Dyslexic Subtypes

Recently, we have applied auditory event related potential (ERP) to study cerebral dominance in dyslexic children classified into subgroups (Fried et al. 1979). We have used Boder's diagnostic approach which classifies dyslexia into subtypes according to reading-spelling patterns (Boder 1971). Thirteen dyslexic and 13 normal subjects were presented with verbal (words *do* and *go*) and nonverbal (musical chords) stimuli, and evoked responses were recorded at two anterior (F_7 and F_8) sites and two posterior (W_1 and W_2) sites. These sites were presumed roughly to overlie the classical speech areas in the left hemisphere (i.e., Broca's area and parieto-temporal cortex or Wernicke's area) and their homologous areas in the right hemisphere. Differences in latency and waveform between ERP's generated by word and musical chord stimuli were calculated by means of cross correlational comparison of the two ERP's. An estimate of the difference between the two ERP waveforms is provided by the maximum value in a series of cross correlation coefficients between the two waves computed at different relative shifts of one wave with respect to the other. This value is the maximum of the cross-correlation function and was designated *max r*. The higher this coefficent of correlation is, the more similar are the waveforms. Essentially two findings are worth emphasizing. The first concerns a latency difference between the normal group and the dyslexic group (regardless of subtypes). Most normals, but only a small portion of dyslexics, exhibited decreased latencies to word as compared to musical chord ERP's. The latency difference between ERP's to the word and chord stimuli was in fact significantly reduced in the dyslexics. The second finding concerns only one of the dyslexic subtypes. While normal readers exhibited greater waveform differences between the word and the chord-ERP's over the left as compared to the right sites (as measured by *max r*), the dysphonetic dyslexics showed no such asym-

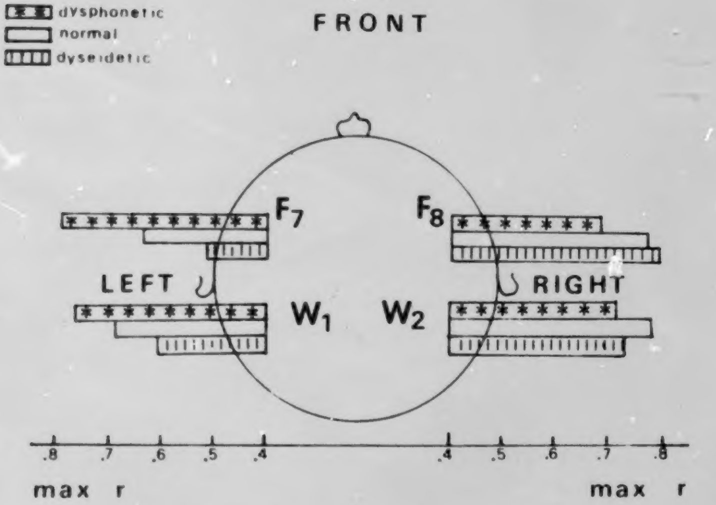

Figure 1. Waveform differences between word and musical chord ERP's as a function of electrode location. Two anterior (F_7, F_8) and two posterior (W_1, W_2) recording sites were used. Waveform differences were estimated through a cross-correlational analysis in which interstimulus latency differences in ERP's were minimized by lagging word on musical chord ERP's to the point at which a maximum correlation (max r) was obtained. Waveform differences were significantly greater over the left hemisphere (F_7, W_1) in the normal and dyseidetic subjects, but not in the dysphonetic group.

metry. As shown in Figure 1, *max r* for normal subjects is smaller at the left sites than at the right sites. This asymmetry is in fact reversed in the dysphonetics. Interestingly, the dyseidetic group exhibits the same asymmetry (in *max r*) as the normal group. In fact judging by the mean values of *max r*, this asymmetry is even larger in the dyseidetics than in the normals. The findings of greater waveform differences over the left as compared to the right hemisphere in normal children is consistent with results of other studies in adults (Brown et al. 1973; Wood et al. 1971), and can be interpreted as a reflection of the left hemisphere capacity to differentiate between verbal and nonverbal stimuli. The lack of greater word-musical chord ERP waveform differences over the left hemisphere in the dysphonetic group suggests an impaired left hemispheric auditory-linguistic information processing, and possibly a pattern of inadequate cerebral dominance. It is possible, therefore, that Orton's hypothesis holds for dysphonetic dyslexia. But does it hold for dyseidetic dyslexia? Dyseidetic children were found to exhibit normal (or maybe "more than normal") patterns of left-greater-than-right waveform differences. Judged by the measures of the above study, the dyseidetics differ from normals, not in cerebral-dominance patterns, but in overall latency measures only. It is not inconceivable that future studies using visual, rather than auditory, stimuli may be more successful in identifying right-hemisphere processing abnormalities in dyseidetic subjects. It is most likely, however, that cerebral-dominance abnormalities in dyseidetics, if any, will be different than those in dysphonetics.

The dyseidetics are estimated to constitute only a small portion of the dyslexic population (Boder 1973). However, it is this group, which most likely does not have any left-hemispheric impairment, that has been overlooked by the researchers of Orton's hypothesis. Clearly the inclusion of two dyslexic types differing in pattern of cerebral dominance in one, supposedly homogeneous, experimental group in a study which examines cerebral dominance, will probably lead to the elimination of any difference that may exist between each of the subtypes and the normal group. Indeed in the study by Fried et al., had the dyseidetic and dysphonetic been treated as one group, no significant hemispheric differences between the experimental and the control group could have been detected.

Conclusions

Evidence of different syndromes of developmental dyslexia raises the question of the interaction between dyslexic types and patterns of cerebral dominance. Some of the proposed classifications of dyslexia, and most notably the one proposed by Boder (1971), strongly suggest that dyslexic subtypes, that can be identified clinically by reading-spelling patterns, may possess different or opposite cerebral dominance patterns. Thus, research of cerebral dominance in dyslexia (i.e., Orton's hypothesis) should involve careful selection and classification of subjects. When this is done it can be shown that electrophysiological measures can identify cerebral-dominance abnormalities in at least one subtype of developmental dyslexia.

References

Boder, E. 1971. Developmental dyslexia: prevailing diagnostic concepts and a new diagnostic approach. *In* H.R. Myklebust (ed.). *Progress in Learning Disabilities*, Vol. 2 New York: Grune and Stratton.

Boder, E. 1973. Developmental dyslexia: a diagnostic approach based on three atypical reading-spelling patterns. *Dev. Med. Child Neurol.* 15:663-687.

Benton, A.L. 1975. Developmental dyslexia: neurological aspects. *In* J. Friedlander (ed.). *Advances in Neurology*, Vol. 7. New York: Raven Press.

Brown, W.S., Marsh, J.T., and Smith, J.C. 1973. Contextual meaning effects on speech-evoked potentials. *Behav. Biol.* 9:755-761.

Bryden, M.P. 1970. Laterality effects in dichotic listening: relations with handedness and reading ability in children. *Neuropsychologic* 8:443-450.

Buchsbaum, M. and Wender, P. 1973. Average evoked responses in normal and minimally brain dysfunctioned children treated with amphetamine: A preliminary report. *Arch. of Gen. Psychiatry* 29:764-770.

Conners, C.K. 1971. Cortical visual evoked response in children with learning disorders. *Psychophysiology* 7:418-428.

Critchley, M. 1970. *The Dyslexic Child.* Springfield: Charles C Thomas, Publisher.

Dimond, J.S. and Beaumont, J.G. 1974. (eds.). *Hemisphere Function in the Human Brain.* London: Elek Science.

Donchin, E., Kutas, M., and McCarthy, G. 1977. Electrocortical indices of hemispheric utilization. *In* S. Harnard, R.W. Doty, L. Goldstein, J. Jaynes and G. Krauthamer (eds.). *Lateralization in the Nervous System.* New York: Academic Press.

Doyle, J.C., Ornstein, R., and Galin, D. 1974. Lateral specialization of cognitive mode: EEG frequency analysis. *Psychophysiology* 11:567–578.

Fried, I., Tanguay, P.E., Boder, E., Doubleday, C., and Greensite, M. 1979. Developmental dyslexia: electrophysiological evidence of clinical subgroups. Submitted for publication.

Friedman, D., Simon, R., Riter, W., and Rapin, I. 1975. Cortical evoked potentials elicited by real speech words and human sounds. *Electroencephalography and Clinical Neurophysiology* 38:13–19.

Galin, D. and Ornstein. R. 1972. Lateral specialization of cognitive mode: an EEG study. *Psychophysiology* 9:412–418.

Ingram, D. 1975. Cerebral speech lateralization in young children. *Neuropsychologia* 13:103–105.

Ingram, T. T. S., Mason, A. W., and Blackburn, I. 1970. A retrospective study of 82 children with learning disability. *Dev. Med. Child Neurol.* 12:271–281.

Kimura, D. 1961. Cerebral dominance and the perception of verbal stimuli. *Can. J. Psychol.* 15:166–171.

Kimura, D. 1966. Dual functional asymmetry of the brain in visual perception. *Neuropsychologia* 4:275–285.

Kinsbourne, M. and Warrington, E.K. 1966. Developmental factors in reading and writing backwardness. *In* J. Money (ed.). *The Disabled Reader: Education of the Dyslexic Child.* Baltimore: John Hopkins Press.

Levy-Agrest, J. and Sperry, R.W. 1968. Differential perceptual capacities in major and minor hemispheres. *Proc. Nat. Acad. Sci. USA* 61:1151.

Marshal, J.C. and Newcombe, F. 1973. Patterns of paralexia: A psycholinguistic approach. *Dev. Med. Child Neurol.* 2:175–199.

Morgan, A.H., MacDonald, H., and Hilgard, E.R. 1974. EEG alpha: lateral asymmetry related to task and hypnotizability. *Psychophysiology* 11:275–282.

Myklebust, H.R. 1965. *Development and Disorders of Written Language: Picture-Story Language Test.* New York: Grune and Stratton.

Olson, M.E. 1973. Laterality differences in tachistoscopic word recognition in normal and delayed readers in elementary school. *Neuropsychologia* 11:343–350.

Orton, S.T. 1937. *Reading, Writing and Speech Problems in Children.* New York: W.W. Norton and Company.

Pirozzolo, F.V. 1978. *The Neuropsychology of Developmental Reading Disorders.* New York: Praeger Publishers.

Preston, M.S., Guthrie, J.T., and Childs, B. 1974. Visual evoked responses (VERs) in normal and disabled readers. *Psychophysiology* 11:452–457.

Preston, M. S., Guthrie, J.T., Kirsch, I., Gertman, D., and Childs, B. 1977. VERs in normal and disabled adult readers. *Psychophysiology* 14:8–14.

Sklar, B., Hanley, J., and Simmons, W. W. 1973. A computer analysis of EEG spectral signatures from normal and dyslexic children. *IEEE Transactions of Biomedical Engineering,* Vol. BME-20:20–26.

Sobotka, K.R. and May, J.G. 1977. Visual evoked potentials and reaction time in normal and dyslexic children. *Psychophysiology* 14:18–24.

Witelson, S.F. 1977. Developmental dyslexia: Two right hemispheres and none left. *Science* 195:309–311.

Wood, C.C., Goff, W.R., and Day, R.S. 1971. Auditory evoked potentials during speech perception. *Science* 173:1248–1251.

Yeni-Komshian, G.H., Isenberg, S., and Goldberg, H. 1975. Cerebral dominance and reading disability: left visual field deficit in poor readers. *Neuropsychologia* 13:83–94.

Zaidel, E. 1978. Lexical organization in the right hemisphere. *In* Buser and Rougeul-Buser (eds.). *Cerebral Correlates of Conscious Experience* INSERM Symposium, No. 5. Elsevier/North-Holland Biomedical Press.

Zangwill, O.L. 1960. *Cerebral Dominance and its Relation to Psychological Function.* Edinburgh: Oliver and Boyd.

Zurif, E.G. and Carson, G. 1970. Dyslexia in relation to cerebral dominance and temporal analysis. *Neuropsychologia* 8:351–361.

LINGUISTIC SKILLS AND DYSLEXIA

Children's Concepts of Language in Learning to Read

Che Kan Leong, Ph.D.

Institute of Child Guidance and Development
University of Saskatchewan
Saskatoon, Saskatchewan, Canada

Introduction

This paper discusses the concept of linguistic awareness and the relation of reading and not reading to primary linguistic activities. The structure and function of language in its cognitive and communicative aspects should be the basis for reading programs. A study on explicit knowledge of phonemes, syllables and sentences is outlined to illustrate language awareness.

As a child grows and develops, his skills in listening and speaking become progressively more complex. Along with the development of the primary linguistic abilities of listening and speaking, a child should become more aware of his linguistic experience and should learn to reflect upon this experience. This conscious, deliberate metalinguistic awareness of language is referred to as "linguistic awareness" (Mattingly 1972).

Awareness underpinning skilled performance, as in listening and speaking, can be at two levels. The philosopher Polanyi (1964) discusses *subsidiary* and *focal* awareness:

> Subsidiary awareness and focal awareness are mutually exclusive. If a pianist shifts his attention from the piece he is playing to the observation of what he is doing with his fingers while playing it, he gets confused and may have to stop. This happens generally if we switch our focal attention to particulars of which we had previously been aware only in their subsidiary role. . . . This scheme can be easily reformulated and expanded in terms of *meaning*. If we discredit the usefulness of a tool, its meaning as a tool is gone. All particulars become meaningless if we lose sight of the pattern which they jointly constitute.

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> The most pregnant carriers of meaning are of course the words of a language, and it is interesting to recall that when we use words in speech or writing we are aware of them only in a subsidiary manner (pp. 56-57).

A practical example of the distinction between subsidiary and focal awareness is shown in the act of hammering a nail. In the process, the nail is the focal object of attention while the hammer occupies a subsidiary role. For many children, awareness of language activities (the use of sentences, phrases, words or smaller units) is at the subsidiary level. The acquisition of verbal skills will be facilitated if their understanding is brought to the focal level.

A decade ago in a conference on the reading process (Kavanagh 1968) the point was forcefully made that reading is parasitic on language. At a more recent conference, the nature of reading as a language-based activity and the relationship between reading and speech perception were further explicated (Kavanagh and Mattingly 1972). While acknowledging differences between written and spoken language, one of the participants (Mattingly 1972, p. 145) explained the relationship well:

> Reading as a deliberately acquired, language-based skill, [is] dependent upon the speaker-hearer's awareness of certain primary linguistic activity. By virtue of this linguistic awareness, written text initiates the synthetic linguistic process common to both reading and speech, enabling the reader to get the writer's message and so to recognize what has been written.

The aim of the present paper is to discuss the reading-language relationship and to report on an empirical study of linguistic awareness in beginning readers.

Language Development—Structure and Function

In language development there is wide individual variation. Some children begin language production primarily by using single words that are clearly articulated, while others use phrases that are difficult to comprehend. The *functions* of language also differ. The single word producers appear to use language for naming, while the other group uses it for expressing needs and feelings. Such differences may be due to differences in the linguistic styles of mothers or in their verbal interactions with their children. These differences reflect different *conceptualizations* about the use of language. As the child progresses in his language usage, he gains proficiency in these areas: (1) use of prosodic, junctural and other suprasegmental linguistic conventions; (2) use of content words to define meaning, to declare, question, and demand; and (3) use of utterances with greater precision.

The difference in precision or specification with which preschoolers or beginning readers use language can be illustrated with the following examples:

(a) I want to go *with* Dad. (accompaniment)

(b) I broke the chair *with* a hammer. (instrumental)

The progression is from the first to the second use of the word *with*. Similarly, there is a sequence and wide individual variation in the development of syntax and other linguistic forms. Young children rarely use conditional (*if, so*) relationships. They express causal relationship before a temporal one (*when* and *while*), temporal simultaneous relationships before temporal sequential relationships (*before* and *after*). Structures such as "I promised him to go" or "she showed the girl the boy" in violation of the "minimal distance principle" will emerge later.

The emergence of lexical categories and level or rules is characterized by differentiation and integration. Each differentiation involves greater restrictions on possible linguistic contexts. An example is given by C. Chomsky (1969):

(a) Bozo (the clown) tells Donald (the duck) to hop up and down.

(b) Bozo promises Donald to hop up and down.

In both sentences the subject of the verb *hop* is not expressed and must be supplied by the listener. C. Chomsky suggests that when the syntactic structure associated with a particular word is at variance with a general pattern in the language that structure will be learned later. When asked to show the appropriate actions, young children make Donald do the hopping in both cases.

As differentiation of categories and rules proceeds, increasing integration is also taking place. Noun phrases are integrated into more varied slots in utterances. And more rules are combined in a single utterance. The ability to pack a greater density of ideas into a single sentence by embedding one sentence in another is illustrated in the following sentence from a grade-four child:

> The captain said / if you can score one goal / I will give this present to you / instead of the other one / that you asked for earlier.

As development proceeds, the child's own language comprehension and production require less nonverbal support. This does not mean that, as children develop, these sentences are more interpretable apart from the context in which they occur. What it means is that disambiguation by context is gradually replaced by disambiguation by vocabulary and sentence structure. The extent to which disambiguation occurs varies with individual children and correlates with their cognitive development. The overall linguistic-cognitive development will prescribe the child's level of competence in the acquisition of reading.

The ability to free language from dependence on its non-linguistic context and to communicate ideas through words and sentence structures is referred to as coding ability or decontextualization. Examples of context-bound and context-free communication can be found in an affectionate embrace to show love as contrasted with John Donne's metaphysical poem in which he compares lovers to a pair of compasses with one being the center and the other moving round a constant radius. The embrace cannot explain the subtleties of language that can draw on other experiences. Language thus can refer to elements outside a particular situation in a way that non-linguistic channels cannot. Certain users, however, are context-bound in the sense that they can only operate within a limited number of situations. This brings to mind the "restricted code" and "elaborated code" that Bernstein (1961, 1972) has made familiar to us. Some children can often communicate, as well as the needs of the situation require, in a limited number of contexts, such as home, the playground, the closed peer group, but not in broader social and educational situations. In limited situations, there is a large basis of shared information which the speakers are not required to be explicit about; and hence the restricted code might suffice. In contrast, the elaborated code is a language of explicitness and is not restricted to a few particular situations.

It is important to understand that the difference between restricted and elaborated codes is not a matter of formal grammar or dialect. The potentials of both are present and some children preponderantly make use of one type of code and others of another type. In his introduction to a work on "functions of language in the classrooms" Hymes (1972) discusses Bernstein's more recent conceptualization this way:

> It would be easy to conclude that the "elaborated" code with its universalistic meanings is simply superior to the "restricted" code . . . and that the task of the school is to replace the one by the other. This conclusion would distort Bernstein's meaning. . . . For Bernstein

> maintains that one must respect, understand and maintain the culture of the child, including its "restricted code," but that one must also give the child the essential elements "elaborated code" with its universalistic meanings. . . . For in his conception it is the "elaborated code" which contains an elaboration of means for "talking about talk," a meta-language, in other words, for objectifying and analysing the forms, school, and society at large (pp. xlv–xlvi).

The context-bound and context-free use of language is discussed at some length because the coding ability of children is essential to language acquisition. The child is helped in his language development by what he is encouraged to say, and not simply by what he hears. Adults play a part in this process. Cazden (1977) and Cazden and Bartlett (1973) emphasize that it is necessary to teach language skills as a component of communication competence. Their views may be summarized as follows:

> (1) Various codes, written, oral, restricted or elaborated draw on the same language system. The difference between them lies in the function they serve and the context in which they are used. Thus curriculum designs should encourage the child to define and express ideas that he would not otherwise talk about.
>
> (2) A full language program requires language experiences which stimulate the functional use of language.
>
> (3) It is the child's code, rather than his speech variant, that we want to extend orally and transfer to the written and read language.
>
> (4) There must be a division of labor so that children carry on different activities but also have the need to discuss their ideas and plans with one another.
>
> (5) The object of concern should be language use in the total school environment and not just in a particular period of the day. Simulations through plays and dramatizations are better than pattern drills as the focus is on communication in a variety of contexts.

The above views predicating reading on oral language finds strong support from the work of developmental psycholinguists. Brown (1973), for example, discusses the importance of meaning and communicative roles of language quite apart from syntactical development. He points out that in language acquisition and development, construction rules emerge at different times and the speaker and listener use various rules to move between speech and meaning just as the reader uses different construction rules to gauge the meaning of the printed page. The importance of language through purposeful use and not just through the working of exercises detached from context is one central theme of the Bullock Report (1975). In this document it is recognized that concepts are learned from experience with their exemplars so that the child feels the need for more elaborate forms and is in turn motivated to extend the complexity of language available to him. These ideas have been translated into practice at the programmatic level. Two such programs outside North America deserve attention. One is a project conducted by Gahagan and Gahagan (1970) in East London. Based on Bernstein's concept, the training program provides for activities designed to improve speech (extended narrative, explanation, detailed description, expression of uncertainty and the hypothetical, description of feeling and relationships), and to improve structure and vocabulary. The work involves the use of various games, and teachers are asked to set aside 20 minutes a day for it. The other is the Mount Gravatt Project, which has been ongoing for over a decade in Brisbane, Australia (see Hart, Walker, and Gray 1977). The early phase of this project concentrated on collecting a large oral language data base from random samples of children at the ages of 5½, 6½, 8½ and 10½. For the older two age groups (8½ and 10½) "spontaneous" written language samples were also collected. The corpus of words, phrases, and sentences was computer-analyzed to extract frequently occurring units of language. A performance type of analysis with competence implications has yielded data to form the language control for the Mount Gravatt reading program. The language that children use is analyzed against the system set up by the children concerned and not against an adult framework (see Halliday 1975). Based as it is on this and on the related premise that ability to interpret and create written language is inextricably interwoven with ability to communicate in oral language, the program is a viable one.

I hope I have made clear that there is more to using, learning and teaching a language than knowledge of the linguistic rules indicates. Communicative competence is a combination of rules of grammar and rules of language use. The "tacit" knowledge of language rules may be sufficient for primary linguistic activities of listening and speaking; but "explicit" knowledge is needed for the secondary activity of reading (Elkonin 1971; Liberman, Shankweiler, Liberman, Fowler and Fischer 1977). In summing up the recent conference on language by ear and by eye, Miller (1972) emphasizes this explicit knowledge of language, or linguistic awareness, as the most important issue raised. What follows is the summary of an empirical study that I conducted with C.F. Haines (Leong and Haines, in press) on one aspect of linguistic awareness—the child's conscious analysis of words and sentences.

Beginning Readers' Analysis of Words and Sentences

In learning to read, the child should have a clear concept of a "word", a "sentence," and should be aware of their constituent parts: phonemes, syllables, and phrases. He must also map the written word to the spoken word. Reid (1966), Downing and Oliver (1974) and Ehri (1975) have shown that pre-readers are not aware of word boundaries nor that words are spatially ordered groups of letters corresponding to temporally ordered sounds. Ehri stated succinctly that "readers, in contrast to pre-readers, possess substantial conscious awareness of lexical as well as syllabic constituents of speech and that readers' knowledge of function words is especially advanced relative to that of pre-readers" (p. 211). Researchers at the Haskins Laboratories (Liberman, Shankweiler, Fischer and Carter 1974; Liberman, Shankweiler, Liberman, Fowler and Fischer 1977) have found that the ability to segment a word into phonemes does not appear until about age five. One reason for this is that phonemic boundaries are not clearly marked and consonant segments are encoded at the acoustic level into the vowel. Savin (1972) noted that children who failed to learn to read by the end of grade one were unable to analyze syllables into phonemes, were insensitive to rhymes and had difficulty manipulating sounds as in Pig Latin. All the above observations suggest that there is a connection between segmenting words into syllables and phonemes and early reading.

At the sentence level, Menyuk (1964) found a sentence repetition task differentiated between normal and language-delayed groups, while Taylor (1969) noted that content influenced the ability to reproduce sentences.

Linguistic Awareness in Primary Grade Children

The empirical study summarized below aimed at testing linguistic awareness in grade-one, grade-two, and grade-three children. Twenty-four children were randomly selected from each of these grades, making a total of 72 children. Their ability to segment utterances into syllables and phonemes and their skills in the recall of sentences of low and high complexity were explored. The children's performance on these tasks were examined: Task 1—a phoneme segmentation task; Task 2—a syllable segmentation task; Task 3—a task tapping the number and order of sound patterns; Task 4—a sentence repetition task with sentences of low and high complexity.

The tests of segmentation into phonemes (Task 1) and into syllables (Task 2) were from Liberman et al. (1974). Each test consists of 42 individual items varying in length from one to three segments (phonemes or syllables) and items for each segment length are randomly arranged in the test lists. Under the guise of a tapping game each child was required to indicate the number (from one to three) of segments (phonemes or syllables) corresponding to those in each of the 42 items which were prerecorded on a cassette tape. For Task 3 the Lindamood Auditory Conceptualization Test (LAC) (Lindamood and Lindamood 1971) was used. The LAC consists of a series of encoding tasks (maximum score of 12) aimed at testing the ability to discriminate one speech sound from another and the ability to perceive the *number* and *order* of sounds within a spoken pattern, such as in perceiving the difference between "tap" and "apt." It is particularly in the second areas of how and where auditory patterns differ that the LAC provides insight into linguistic awareness at the word level. Task 4 is a 16-item sentence repetition task, each with a ten-word sentence. Eight of the 16 sentences are of the declarative type and are designated as low complexity. The other eight sentences involve embedded or conjoined clauses and are labelled as high complexity ones. An example of a low complexity sentence is one with an expanded declarative: "A little girl by the pond was watching some ducks." An example of a high complexity sentence is: "The not very well painted toys want painting during holidays."

The results of the study can be summarized as follows. One the segmentation tasks across grades, syllable segmentation,was easier than phoneme segmentation for children in grades one, two and three. While the phoneme segmentation task by itself did not show any grade difference, the syllable segmentation task did differentiate between grades. The overall poorer performance of the children in phoneme segmentation was accentuated with the addition of a test tapping auditory conceptualization of the number and order of speech patterns. Further, children across the grades found high complexity sentences more difficult to repeat accurately than low complexity sentences with almost parallel relative facility grade for grade. These findings are illustrated in Figure 1 and Figure 2.

In connection with this study, it may be mentioned that the sentence repetition task shows promise as a diagnostic tool. In a different study involving 38 above-average and 38 below-average readers this test has also been shown to be discriminating (Leong 1978). Vogel (1975) has drawn

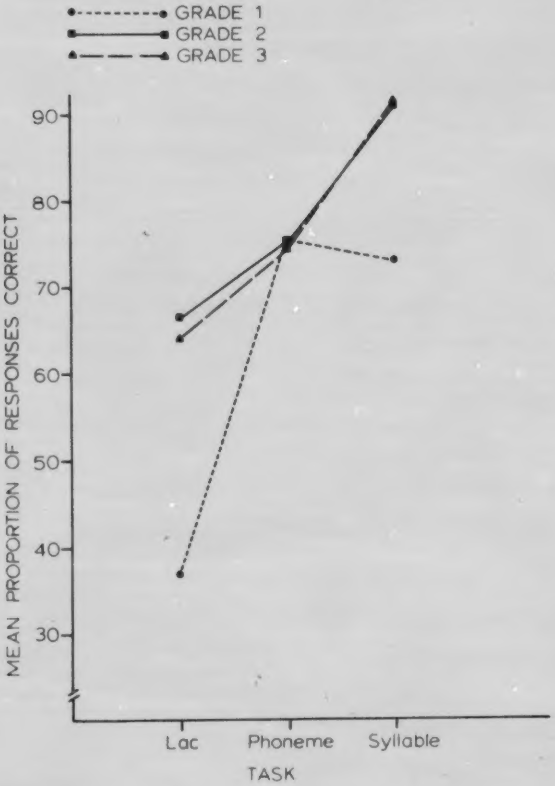

Figure 1. Mean proportion of responses correct by grade on three segmentation tasks.

attention to the qualitative analysis of sentence elicitation tasks in her study of dyslexics. Working with subjects with brain lesions, Newcombe and Marshall (1967) have incorporated different kinds of sentences in their sentence repetition test. The categories include: (a) grammatically well-formed and meaningful sentences, (b) grammatically well-formed but semantically deviant sentences, such as "colorless green ideas sleep furiously," (c) well-formed sentences with the possibility of confusion such as, "Didn't the lion chase the tiger?" (d) sentences with modifier-strings in correct and incorrect sequence such as, "He has sold the long heavy grey shiny car," and (e) random word-strings such as "not in a tree to the lake ran with."

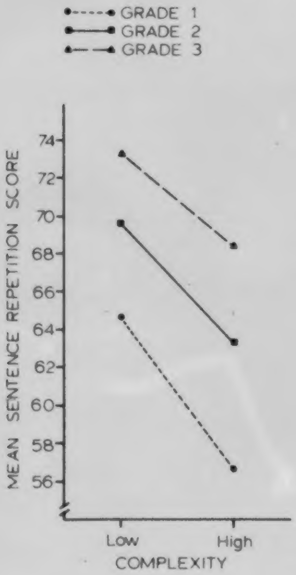

Figure 2. Mean performance by grade on repeating sentences of low and high complexity.

Educational Implications

From the discussion of the communicative role of language and the tacit knowledge of language as precursors to reading and not reading, what are the implications for educating the child? For our purpose there is the importance of the learning environment and there is the programmatic aspect for children learning to read.

For the beginning reader the home provides an important learning environment. The suggestion that the backward child often lacks linguistic stimulation is too vague to be of any use to help him. It may be that his language experience differs from that of other children or that his mother's responses are inadequate. She may fail to grasp and respond to the child's developing meaning. She may not answer questions at all or she may answer them only summarily so that she fails to help the child to project his meaning. In such a case, the interests and meanings of the child and the adult fail to come together and it is as though their conversation related to different topics. These experiences do little to help the child to

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project into the adult's feelings or meanings, or to go beyond the narrow confine of a particularized context. In contrast, for children doing well in their basic subjects, it is likely that the dialogue between adult and child is a major means of learning for the child. The child is helped towards his parent's viewpoint and gradually comes to project his viewpoints. This is presumably Mattingly's point about "speaker-hearer's awareness of certain primary linguistic activity." In communicating with a child we are transmitting meaning. For this, a child needs help. He is essentially immature and egocentric. The success in communication comes when there are mutual shared experiences and interpretations, as often happens first in the home. Bruner (1971, p. 107) has drawn attention to the importance of dialogue: "There are doubtless many ways in which a human being can serve as a vicar of the culture, of its knowledge. But, I dare say that few are so potentially powerful as participating in dialogue."

In this connection, White (1971) makes some interesting observations on the development of educability in young children. He noted that the most effective mothers are those who perform the functions of "designer and consultant" and are indulgent and responsive, encouraging the child to explore. This permissive, responsive role is contrasted with the more didactic educational treatments in schools by Cazden (1974), and this contrast between naturalistic language acquisition and language education is seen by her as a paradox. She suggests that the more didactic educational programs may bring about short-term gains and language mimicry, but not stimulation, while the home-like atmosphere yields little immediate effect although the results are more lasting.

At the instructional level there are programs that help a child to acquire some facility in understanding the spatial-temporal correspondence of symbols and sounds. With characteristic insight, Orton (1937) pointed out that "the major interference with the process of recognizing or recalling the word is a failure to repicture the exact order of its constituent letters" (p. 145). He went on to emphasize the importance of sequence building—proper spatial orientation and sequences with visual symbols and proper temporal sequences of sounds. All this predates more recent work, such as the words in color program by Gattegno (1962).

Using a system of color coding for temporal sequences of visual signs and with the syllable as the smallest unit, Gattegno attempts to teach the child the flexible space-time fusion such as */ap/, /ip/, /op/*. Similar and more recent auditory skills programs include that by Lindamood and Lindamood (1969) which stresses the analysis of syllables into phonemes, and that by Rosner (1974, 1975), which trains phonological analysis with the elision technique. Wallach and Wallach (1976) have devised a program which, among other things, helps the child to recognize and manipulate sounds. All these programs show a close affinity to Elkonin's (1963, 1973) work on teaching beginning reading in Russian. The aim here is "not the symbolizing of separate sounds, but their separation and modeling as a succession" (Elkonin 1973, p. 563). In a recent review of phonemic awareness skills Golinkoff (1978) finds evidence in the literature that such skills boost reading achievement. She also raises some unanswered questions having to do, for example, with entry skills and the long-term effect of the explicit knowledge needed to begin reading.

Conclusion

To summarize, acceptance of reading as secondary to, and dependent on, the primary activities of speaking and listening does not mean that reading is simply speech in print, albeit reading is a language-based activity. Listening and speaking seem to proceed from the meaning of the discourse to analysis; whereas written language comprehension proceeds from analysis to meaning, at least for some beginning readers and some poor readers. Analysis of speech takes place at the unconscious or tacit level; conscious analysis of segments of print (sentences, phrases, words, syllables and phonemes) is often required in reading, especially at the initial stage. Good readers pass this decoding stage relatively effortlessly; poor readers may still need to deal with the mechanics of reading before these become automatic. Thus, while children should be introduced to reading through a variety of rich language experiences, there should be a parallel process of the development of subskills.

References

Bernstein, B. 1961. Social class and linguistic development: A theory of social learning. *In* A. H. Halsey, J. Floyd and C. A. Anderson (eds.). *Economy, Education and Society.* New York: Free Press of Glencoe.

Bernstein, B. 1972. A critique of the concept of compensatory education. *In* C. G. Cazden, V. P. John and D. Hymes (eds.). *Functions of Language in the Classroom.* New York: Teachers College Press, Columbia University.

Brown, R. W. 1973. *A First Language.* Cambridge, Massachusetts: Harvard University Press.

Bruner, J. 1971. *The Relevance of Education.* London: George Allen and Unwin.

Bullock, A. (Chairman). 1975. *A Language for Life: Report of the Committee of Inquiry appointed by the Secretary of State for Education and Science.* London: H.M.S.O.

Cazden, C. B. 1974. Two paradoxes in the acquisition of language structure and functions. *In* K. Connolly and J. Bruner (eds.). *The Growth of Competence.* New York: Academic Press.

Cazden, C. B. 1977. Concentrated versus contrived encounters: Suggestions for language assessment in early childhood education. *In* A. Davies (ed.). *Language and Learning in Early Childhood.* London: Heinemann.

Cazden, C. B. and Bartlett, E. 1973. Review of Gahagan, D. M., and Gahagan, G. A. *Talk reform: Explorations in language for infant school children.* (Beverly Hills, California: Sage, 1970) Review in *Language in Society*, 1973, 2:147–160.

Chomsky, C. 1969. *The Acquisition of Syntax in Children from 5 to 10.* Cambridge, Massachusetts: M.I.T. Press.

Downing, J. and Oliver, P. 1974. The child's conception of "a word." *Reading Research Quarterly* 9:568–582.

Ehri, L.C. 1975. Word consciousness in readers and prereaders. *J. of Educational Psychology* 67:204–212.

Elkonin, D.B. 1963. The psychology of mastering the elements of reading. *In* B. Simon and J. Simon (eds.). *Educational Psychology in the U.S.S.R.* Stanford, California: Stanford University Press.

Elkonin, D. B. 1971. Development of speech. *In* A. V. Zaporozhets and D. B. Elkonin (eds.). *The Psychology of Preschool Children.* Cambridge, Massachusetts: M.I.T. Press.

Elkonin, D. B. 1973. U.S.S.R. *In* J. Downing (ed.). *Comparative Reading: Cross-national Studies of Behavior and Processes in Reading and Writing.* New York: Macmillan.

Gahagan, D. M. and Gahagan, G. A. 1970. *Talk reform.* London: Routledge and Kegan Paul.

Gattegno, C. 1962. *Words in color.* Chicago: Learning Materials, Inc.

Golinkoff, R.M. 1978. Critique: Phonemic awareness skills and reading achievement. *In* F. B. Murray and J. J. Pikulski (eds.). *The Acquisition of Reading.* Baltimore: University Park Press.

Halliday, M. A. K. 1975. *Learning How to Mean.* London: Edward Arnold.

Hart, N. W. M., Walker, R. and Gray, B. 1977. *The Language of Children—A Key to Literacy.* Reading, Massachusetts: Addison Wesley.

Hymes, D. 1972. Introduction. *In* C. B. Cazden, D. Hymes and V. P. John (eds.). *Functions of Language in the Classroom.* New York: Teachers College Press, Columbia University.

Kavanagh, J.F. (ed.). 1968. *Communicating by Language: The Reading Process.* Bethesda, Maryland: U. S. Department of Health, Education, and Welfare, National Institutes of Health; Government Printing Office.

Kavanagh, J. F. and Mattingly, I. G. (eds.). 1972. *Language by Ear and by Eye: The Relationships between Speech and Reading.* Cambridge, Massachusetts: M.I.T. Press.

Leong, C. K. 1978. Cognitive patterns of "retarded" and below-average readers. Manuscript in preparation.

Leong, C. K. and Haines, C. F. Beginning readers' analysis of words and sentences. *J. of Reading Behavior. (in press).*

Liberman, I., Shankweiler, D., Fischer, W. and Carter, B. 1974. Explicit syllable and phoneme segmentation in the young child. *J. of Experimental Child Psychology* 18:201–212.

Liberman, I., Shankweiler, D., Liberman, A.W., Fowler, C., and Fischer, F. W. 1977. Phonetic segmentation and recoding in the beginning reader. *In* A. S. Reber and D. L. Scarborough (eds.). *Toward a Psychology of Reading.* Hillsdale, New Jersey: Lawrence Erlbaum.

Lindamood, C.H. and Lindamood, P.C. 1969. *Auditory Discrimination in Depth.* Boston: Teaching Resources.

Lindamood, C. H. and Lindamood, P. C. 1971. *Lindamood Auditory Conceptualization Test.* Boston: Teaching Resources.

Mattingly, I.G. 1972. Reading, the linguistic process, and linguistic awareness. *In* J.F. Kavanagh and I.G. Mattingly (eds.). *Language by Ear and by Eye.* Cambridge, Massachusetts: M.I.T. Press.

Menyuk, P. 1964. Syntactic rules used by children from preschool through first grade. *Child Development* 35:533–546.

Miller, G. A. 1972. Reflections on the conference. *In* J. F. Kavanagh and I. G. Mattingly(eds.). *Language by Ear and by Eye.* Cambridge, Massachusetts: M.I.T. Press.

Newcombe, F. and Marshall, J. C. 1967. Immediate recall of sentences by subjects with unilateral cerebral lesions. *Neuropsychologia* 5:329–334.

Orton, S. T. 1937. *Reading, Writing and Speech Problems in Children.* New York: W. W. Norton Company.

Polanyi, M. 1964. *Personal Knowledge: Towards a Post-critical Philosophy.* New York: Harper and Row.

Reid, J. F. 1966. Learning to think about reading. *Educational Research* 9:56–62.

Rosner, J. 1974. Auditory analysis training with prereaders. *The Reading Teacher* 27:379–384.

Rosner, J. 1975. *Helping Children Overcome Learning Difficulties.* New York: Walker.

Savin, H. B. 1972. What the child knows about speech when he starts to learn to read. *In* J. F. Kavanagh and I. G. Mattingly (eds.). *Language by Ear and By Eye.* Cambridge, Massachusetts: M.I.T. Press.

Taylor, I. 1969. Content and structure in sentence production. *J. of Verbal Learning and Verbal Behavior* 8:170–175.

Vogel, S. A. 1975. *Syntactic Abilities in Normal and Dyslexic Children.* Baltimore: University Park Press.

Wallach, M. A. and Wallach, L. 1976. *Teaching All Children to Read.* Chicago: University of Chicago Press.

White, B. 1971. An analysis of excellent early educational practices: Preliminary report *Interchange* 2:71–88.

Assessing Reading and Language Skills: An Interactive System

Robert Calfee, Janet Spector, and Dorothy Piontkowski

Stanford University

Introduction

We have carried out for the past ten years a program of research on the acquisition of reading skills by normal readers. One outcome has been the application of our research to the diagnostic assessment of decoding and comprehension skills of learning-disabled children. Our assessment system has evolved from a theoretical model of reading that builds on a practical analysis of four component skills: *decoding, vocabulary, sentence understanding,* and *text comprehension.* This paper describes ongoing research and development on two basic components of the system: (1) a multidimensional test of reading skills; and (2) an observational procedure for recording the student's performance strategies during reading tasks.

Our experience in testing shows that, for any given task, a child will succeed under some conditions and fail under other conditions. Most present-day tests are poorly designed to pinpoint the conditions that determine success or failure because performance on a test (or subtest) generally produces a single score which is the undifferentiated combination of many elements. The assessment system we have been constructing is designed to measure *relative* strengths and weaknesses. For example our trained clinician, who administers the Wechsler Intelligence Scale for children, pays attention not only to the total score, but also to the *differences* between and among the Verbal and Performance subscores. Similarly, our

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assessment system is designed to emphasize a number of differences in reading performance, differences which provide the basis for measuring patterns of strengths and weaknesses.

The assessment system also incorporates a behavioral observation system for recording the student's strategies in the testing situation. The behaviors direct the tester to conduct further probes of the interface between success and failure. We are especially interested in systematic observation of attention and memory during the testing situation, and in the relation of attention and memory to task performance. The assessment system can be used for diagnosis of reading disability, and can provide a basis for training teachers and reading specialists in both diagnosis and treatment of reading disorders.

In the following sections we will discuss some of the problems currently facing researchers and practitioners in the field of learning disabilities. We will then present the theoretical rationale for a factorial assessment system, and describe our development of such a system. Finally, we will discuss benefits of this approach to assessment for teachers and for students.

Current Problems in Defining and Diagnosing Learning Disabilities

Identification of children with learning disabilities requires specific definition of the disability. Global descriptors like *hyperactive, easily distracted, impulsive, reading disabled,* or *underachieving* provide little information about the diversity of symptomatic behaviors among learning-disabled children and do not allow precise definition or effective remediation. The problem is further compounded by lack of agreement in defining learning disability and by differences in terminology. Benton (1975), reporting on the neurological aspects of developmental dyslexia, finds great confusion in diagnosis and assessment of the "syndrome."

> Because developmental dyslexia is (at least one form of) reading failure of unknown origin, its defining characteristics are for the most part of a negative nature. Since it is essentially a diagnosis by exclusion, it shares the weaknesses of all diagnoses of this type. As already noted, it is failure to learn to read by a child who is of adequate intelligence, who is endowed with adequate vision and hearing, whose oral language skills are sufficiently developed to serve as a basis for learning to read, and who at least at the beginning of schooling, had normal motivation to learn to read. That the condition is due to some

> type of neurological maldevelopment is a likely presumption—but only a presumption. (p. 3.)

The problem of definition is also exemplified in a U.S. Government Accounting Office study (1977) of the relation between learning disability and juvenile delinquency:

> The term "primary learning problem" (learning disability) refers to a demonstrated inability to perform a specific task normally found within the capability range of individuals of comparable mental capacity. It involves deficits in essential learning processes having to do with perception, integration, and verbal and nonverbal expression. Juveniles with learning disabilities generally demonstrate underachievement in one or more academic areas: oral language expression, reading, spelling and written expression, or arithmetic. (p. 7.)

Given the limited consensus on identification and diagnostic procedures, it is not surprising that there is little agreement as to the specific cognitive characteristics that differentiate the learning-disabled population from the population of normal readers. Chalfant and King (1976), after analyzing several common definitions of learning disability, arrived at five more or less distinctive features of the syndrome: task failure, exclusion factors, physiological correlates, discrepancy in performance on different tasks, and psychological correlates. They present ways of assessing a child's disabilities for the first four components, but find difficulty in dealing with the fifth, which is central to making decisions about treatment. They describe psychological processes. as:

> . . . mental or behavioral characteristics of an individual. The word "process" refers to a series of actions or gradual changes which lead toward a particular end. Therefore, the term "psychological process" refers to a series of conditioned actions for: (a) analyzing sensory stimuli, (b) synthesizing these stimuli, (c) storing and retrieving stimuli, and (d) performing symbolic operations. These processes of perception, association, and expression form the basis of learning, thinking, and problem solving. (p. 39.)

Part of the difficulty is that psychological processes are not directly accessible, but must be inferred from the child's behavior in response to task demands, and from his self-report.

Theoretical and operational constructs from perception and cognition, e.g., "sensory integration" or inadequate "visual perception," have frequently served as a basis for constructing and titling tests designed to identify students who are experiencing difficulty in learning to read. Unfortunately, the assumption that these psychological dysfunctions are "real" and can be improved by training has led to effort and time devoted to instruction on the hypothetical ability rather than on the specific reading skills (Mann and Phillips 1967). Although perceptual and cognitive training does lead to better performance on tests designed specifically to measure the skill being taught, there is little evidence that reading is improved as a consequence. Thus, in spite of continued efforts by dedicated researchers to identify and train for deficit abilities, the activities and implementations have not led to improved reading performance (Coles 1978; Hallahan and Cruickshank 1973; Hammill, Goodman and Wiederhold 1974; Venezky 1975). The arguments have been circular—in cases where correlations have been found, it is not clear whether perceptual training led to improved reading or vice versa, or whether other process variables, such as strategies of memory or attention, were involved (Chall 1970).

Bush and Waugh (1976) provide a list of "tests useful in evaluating learning disorders." The nine categories of tests listed—intelligence, visual-motor, reading, developmental, auditory perception, achievement, criterion-referenced, social maturity, and teacher checklist and screening instruments—are global in character and provide little specific guidance to the reading teacher. The authors note that, in spite of the abundance of diagnostic measures,

> Learning-disorder categories, although important for administrative planning, do not help in planning curricula for the variety of problems found in any homogeneous group. For example, any one language-learning-disabled child is different from all others. Thus, teachers work with children whose learning problems are different but whose classifications are the same. They must plan more individualized curricula. Even though a category like language disability or perceptual-motor impairment designates the area of weakness, it does not identify the kind of language or perceptual-motor problem. (p. 125.)

This comment speaks to the problem of nonspecific diagnosis for the teacher. The problem is no less troubling to the researcher who today can use available instruments only to define "good" and "poor readers." Existing reading tests do a poor job of relating the individual items to well-defined reading skills. An analysis of the task requirements for a typical item shows that many different skills are required for success, and weakness in any of these is likely to lead to failure. The high correlations between tests and subtests provide evidence of relatively large and overlapping skill areas (Calfee and Venezky 1969; Lohnes and Gray 1972). Most current tests do not provide distinctive definition of the precise skills being measured, and those tests which are more precise tend to focus on a single dimension at a time, without recognition of the fact that success on a single criterion skill (e.g., pronouncing words that end in *at*) depends on a number of other variables related to the task and the context (Calfee and Drum, in press; Calfee, Fisk and Piontkowski 1975; Calfee and Juel 1978). The tester cannot determine the specific reasons for the child's failure and can state with confidence only the child's general level of performance relative to a larger reference group. Therefore, to say that a student has failed on a reading task is without meaning unless the conditions of his failure are made explicit. The dimensions of task and situation variability need to be specified so that particular patterns of performance can be related to appropriate treatments.

We propose two hypotheses. First, the reading-disabled student is characterized by different patterns of relative performance as compared with more able students. For instance, the normal reader might show relatively little difference between consonant and vowel patterns, whereas poor readers might show relatively large deficits in their ability to handle vowels. The second hypothesis is that reading-disabled students read in a different manner (i.e., with an underlying process structure that is different) than "normal" readers. For example, we might find that normal students handle vowel and consonant patterns by analysis of letter-sound correspondences, whereas poor readers always tackle decoding of new words as integrated "chunks."

We see the need for a system designed to assess contrastive patterns of performance among students who experience difficulty learning to read. We believe these patterns will distinguish the situational, behavioral, and task-related characteristics that differentiate "normal" from learning disabled readers, and will identify distinctive categories of reading disability.

Independent-Process Theory as a Basis for Construction of an Assessment System

The theoretical basis for our work is the independent-process model. In this theoretical approach, a sequence of independent processes is proposed which derives from a curriculum-based analysis of the component skills that make up reading—*decoding, vocabulary, sentence understanding* and *text comprehension.* The original conception of independent processes was by Sternberg (1969) who pointed out that if the theorist has postulated that a cognitive task proceeds through a series of stages, he should be prepared to list one or more factors which have major impact on the operation of each stage. Each factor set should influence performance measures associated with that stage and that stage only.

A generalization of the independent-process approach by Calfee (1976) proposed that each component process in an information-processing analysis should be linked to a unique set of factors and a well-defined set of measures (Figure 1). By "independent" we mean that the factors that influence one process are separable from those that influence another.

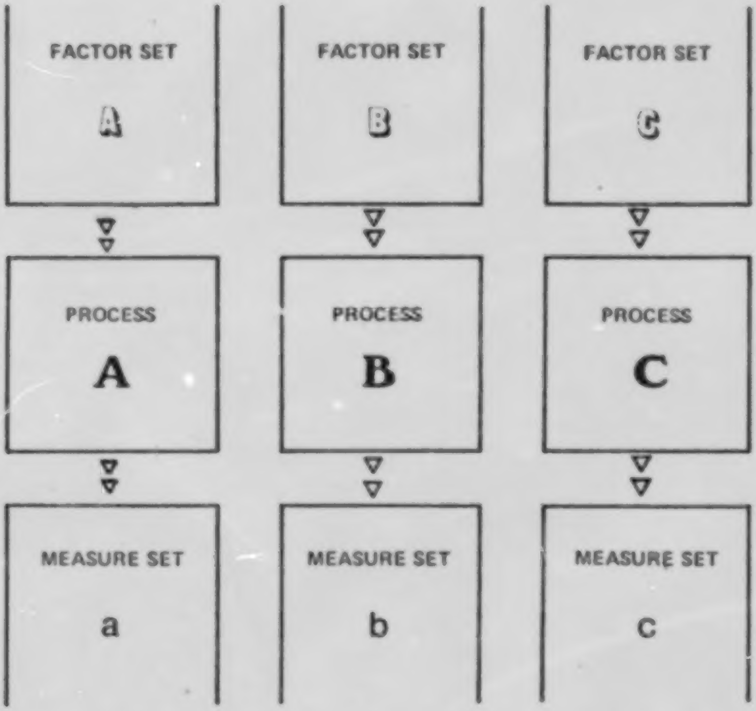

Figure 1. The original generalization of the independent-process model. Associated with each component process is a set of factors and a set of measures, each assumed to be uniquely linked to the process. (After Calfee 1976).

To establish the independence of the processes in a model, a set of factors is defined for each process along with a set of complementary measures. The factor-measure combinations take practical shape as a collection of highly structured subtests. The model predicts that variation in factors associated with a given process will affect only the measure(s) for that process. The factor-measure technique yields student profiles that reveal differences among students in the operation of their cognitive processes during reading.

Independent Processes in Reading

Let us turn to a concrete example to see how the approach works. We propose that the skilled reader proceeds in the analytic fashion shown by the independent-process model in Figure 2. The *independent* processes in the diagram are closely linked to what is taught—*decoding, vocabulary, sentence understanding,* and *text comprehension.* The model is tested by varying factors for each process and measuring responses to each such variation. Practically speaking, the approach is to measure what has been taught under a variety of conditions. The figure gives examples of the kinds of factors and measures that we might include in the assessment system for the proposed model. Each student is then tested under various combinations of the factors, with performance measured for each of the processes in the figure. The test takes the form of a factorial experiment carried out for each student individually as a way of discovering *relative* strengths and weaknesses. As noted earlier, this principle is akin to the one used by the clinical tester who, besides noting a person's *overall* intelligence test score, also considers the *difference* between the verbal and performance subtests.

General Processes in Reading

The model in Figure 2 includes the *general* processes of *attention* and *memory.* Discussion of the learning disability syndrome frequently refers to general symptoms of hyperactivity and impulsivity in handling tasks requiring sustained attention (Anderson, Halcomb and Doyle 1973; Doyle, Anderson and Halcomb 1976; Dykman, Ackerman, Clements and Peters 1971; Hallahan, Kaufman and Ball 1973; Luria 1961; Sykes, Douglas, and Morgenstern 1973). Attentional dysfunction has been consistently cited as a primary reason for reading failure by specialists in learning disabilities (Ross 1976). Attention, however, is a complex entity. It involves the overall level of mental activity, the extent to which the student selects relevant cues and rejects irrelevant information, and the degree to which the student can concentrate the maximum available mental capacity on the task (Piontkowski and Calfee, in press). It is seldom

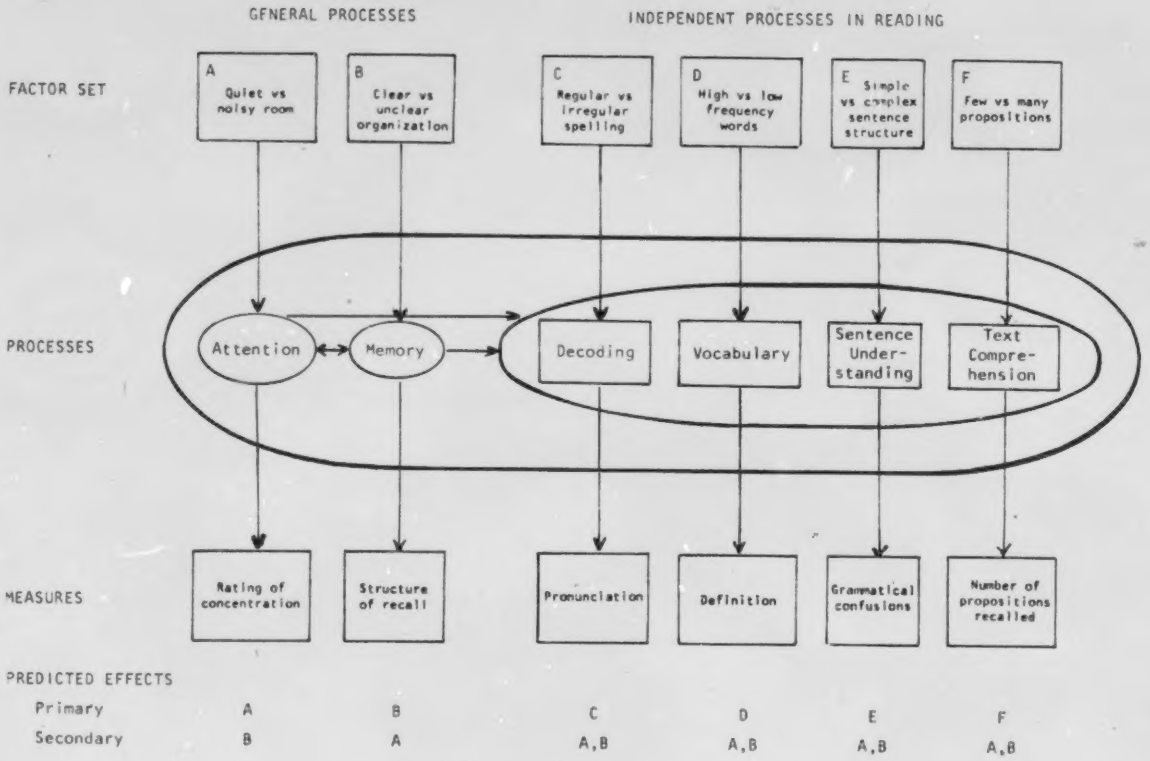
GENERAL PROCESSES
INDEPENDENT PROCESSES IN READING
FACTOR SET
A Quiet vs noisy room
B Clear vs unclear organization
C Regular vs irregular spelling
D High vs low frequency words
E Simple vs complex sentence structure
F Few vs many propositions
PROCESSES
Attention
Memory
Decoding
Vocabulary
Sentence Under-standing
Text Compre-hension
MEASURES
Rating of concentration
Structure of recall
Pronunciation
Definition
Grammatical confusions
Number of propositions recalled
PREDICTED EFFECTS
Primary
Secondary
A B C D E F
B A A,B A,B A,B A,B

Figure 2. Independent-process model for test design which incorporates two general processes and four independent-processes in reading.

clear which facets of attention are being blamed for learning disability in a specific instance. Nevertheless, it is fairly clear that attention, as a general process, is not independent of other processes in reading—all other processes are likely to be dependent upon optimal functioning of attention.

Research findings also point to the involvement of memory in successful reading (Calfee 1975). Johnson (1957) was among the earliest researchers to report evidence of a relationship between "short memory span" and learning disability. A number of other studies support this finding (Katz and Deutsch 1967; Kluever 1971; Koppitz 1976; Senf and Freundl 1971), especially in situations where the memory task is relatively complex. However, more recent studies on the use of mnemonic strategies by reading-disabled children suggest that their apparent short-term memory deficit may actually reflect failure to use appropriate memorial strategies (Torgesen and Goldman 1977; Torgesen 1977; Calfee 1975). Recent work by Flavell (1977) also indicates the significance of intentional behavior in memory functioning. Deficits in memory may sometimes reflect structural deficits, but more often they seem to be due to poor strategies of rehearsal, chunking, and elaboration during execution of the task (Hagen, Jongeward, and Kail, 1975).

Notice that in assessing general processes, we propose measurement within the context of the reading task. In particular, we analyze the contribution of different components of memory and attention through systematic variation of the situational context of the reading task (Figure 3). This approach is in contrast to research which measured attention and memory by tests having no direct relation to reading, and used correlations to determine the contribution of these general processes to reading. By variation in material and instructions, and through the observation system, we can study attention and memory strategies as they influence the child's reading performance in specific situations. We think this is a much more practical and fruitful approach to the investigation of the role of general processes during reading.

Individual Variations in Interactive Processing

Some readers may not follow the route described by Figure 2. They may read in a complex, interactive fashion quite unlike what is predicted by the model. For example, the student whose decoding skills are weak may depend primarily on word familiarity or pictures in order to guess at words from the context. On the other hand, the student whose experience leaves him unfamiliar with the subject matter may comprehend a passage

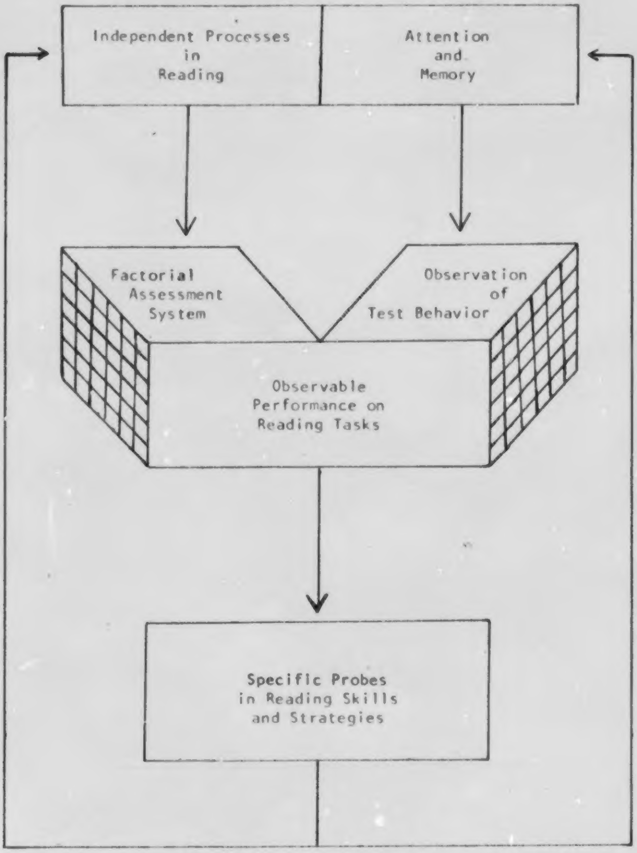
Independent Processes in Reading
Attention and Memory
Factorial Assessment System
Observation of Test Behavior
Observable Performance on Reading Tasks
Specific Probes in Reading Skills and Strategies

Figure 3. A model of the relations among reading processes and strategies, measurement systems, and probes.

only when the words are very easy to decode. Ease of decoding allows him to scan back and forth quickly, thereby gaining some idea of the structure which can then be used to help him assimilate unfamiliar content. In both of these instances, the evidence contradicts the particular independent-process model proposed in Figure 2, since a factor associated with one process influences a measure associated with another process. The finding would not lead to total rejection of the model; the model still might describe the performance of many students quite accurately and parsimoniously. Rather, it would lead to the development of alternative models for groups of students whose patterns of interaction are distinctive.

There is no reason why a single model of reading should fit all children. The independent-process approach provides a tool for detecting differences between students in the reading process, a tool which should be useful in determining how the student's predispositions and the instructional program work together in the development of reading skill. It seems unlikely to us that most students read in an extremely complex or unsystematic fashion. We can understand the nature of the reading process for a student or group of students insofar as we can identify and confirm those processes that do operate in an independent fashion. The model in Figure 2 is a reasonable first approximation to the set of processes that are operating in many students whom we have tested, and a workable framework for describing the interaction of processes in other groups of students.

The Interactive Reading Assessment System (IRAS)

We have developed a preliminary version of an assessment system built upon the principles described above. IRAS (Calfee and Calfee 1977) is an individually administered diagnostic assessment system comprised of sections which correspond to familiar tasks in reading. Each task requires one or more of the component skills from the model in Figure 2. The tasks are those generally accepted as necessary for success in skilled reading—pronunciation and definition of a sample of basic English vocabulary, pronunciation of synthetic words, oral reading and comprehension of sentences and connected prose. The materials in the test cover a wide range of reading skills and knowledge, from the level usually expected of a midyear first-grader to that of a junior high school student. Rapid but comprehensive investigation of the student's reading skills is achieved through an interactive testing format. A branching procedure allows the student to move through different tests depending on his performance, so that little time is spent testing the student on tasks he can do easily or cannot do at all.

On the surface, IRAS has many of the features of tests like the Gray Oral Reading Test (Gray 1967) and informal reading inventories (Cheyney 1972; Kender 1970; Lapp and Flood 1978; Potter and Rae 1973; Silvaroli 1973). However, unlike informal inventories, IRAS is constructed according to a design that permits measurement of difference scores which reflect the student's relative strengths and weaknesses. Moreover, the incorporation of an explicit decision strategy serves to formalize the clinical features of the test. The tester not only is able to "follow his nose" so to speak, but the test actually points the way. If the student fails on any task when it is initially presented in a free-form manner, the tester is directed to check how the student performs when he is given a hint or is prompted. For the student whose problem is lack of confidence rather than lack of knowledge, it is important for the tester to find out that the student can do very well when he is prodded, even though he fails when left on his own. This contrast in performance shows that his problem is unlikely to be solved by teaching content; he needs to be taught that he can succeed if he makes an effort.

IRAS is presently administered in two segments of no more than 30 minutes each. Areas of knowledge tested during the first session are: reading of word lists which vary in familiarity; definition of common words within the student's reading vocabulary and beyond; selected word analysis skills based on pronunciation of synthetic words (consonant sounds, long and short vowels, consonant blends and digraphs, vowel digraphs and R-affected vowels, segmented and unsegmented polysyllabic words); and spelling of synthetic words.

During the second session, the student reads passages aloud, and is monitored for errors and performance fluency. Both literal and inferential comprehension are tested on material within the student's reading level. Then the tester reads more difficult passages and listening comprehension is measured. The materials consist of narrative paragraphs typical of those found in reading texts and literature series.

Throughout the test, the tester also rates several behavioral characteristics of the student's performance. These include the student's understanding of the task, his attention, cooperativeness, and level of physical activity. The rating of behavioral characteristics adds yet another dimension to the assessment of reading skills. The observational method takes advantage of the tester's ability to record differences in the student's response style as task demands change.

Detailed Analysis of Component Skills

IRAS provides a comprehensive picture of the student's reading capability, but the picture is relatively sketchy. In the following sections, we describe procedures for detailed assessment of the four components of reading in Figure 2 (*decoding, vocabulary, sentence understanding, text comprehension*).

Decoding. We have argued elsewhere that acquisition of decoding skills is one of the primary goals of reading instruction and that failure to acquire automaticity in these skills is one of the major sources of reading failure (Calfee 1975; Calfee and Drum 1978). We are not alone in this argument (e.g., Carroll 1978; Chall 1967), though some experts in the field would disagree with the proposition.

In the present version of IRAS, the student's decoding skills are tested by pronunciation of familiar words, by pronunciation of several lists of synthetic words, and by fluency during reading aloud of connected prose. These three tasks represent a useful variety of situations for testing decoding competence and for determining areas of difficulty. However, the tests are not designed to reveal specific contrasts in ability. Once we arrive at an approximate judgment of the child's competence in decoding, we proceed to a set of multidimensional tests or "probes" for more specific investigation of particular decoding skills (Piontkowski 1976). A brief description of the development of a factorial test of simple phonic skills will illustrate the technique.

The first step in planning the test design was an analysis of the essential factors influencing the task of pronouncing a letter string. The primary factor was the character of the letter-sound correspondences. In the total system, we followed the usual distinctions in the curriculum: simple consonants and vowels in *CVC* words, consonant and vowel blends and digraphs, marked (long versus short) vowels, and polysyllabic words. Separate designs were then prepared for each of these primary segments.

The process of planning the design for one such segment, consonant-vowel-consonant correspondence, is illustrated in Figure 4. Three factors are varied in the design: (a) the position of the orthographic unit (initial consonant, medial vowel, final consonant, or whole word); (b) the type of material (picture, real word, or synthetic word); and (c) the task (identification, verbal production, or written production).

The range of combinations in this design covers the variety of conditions which children encounter during learning and testing. Somewhere in this set most beginning readers will succeed; if a student can perform all tasks with ease, we can conclude that he has mastered decoding of *CVC* patterns.

As portrayed in Figure 4, the design is implemented by creating a mini-test for each cell of the design. A small number of words is selected — the two words above the dashed line are samples, administered as a brief pretest during which corrective feedback is given. Only if the student succeeds on one or both of the sample items does the tester continue with the cell. The remaining four words are the criterion items. Successful completion of the cell requires accuracy on three of the four items. Each student's

	Identification (T_1)			Verbal Production (T_2)			Written Production (T_3)		
	Picture M_1	Real Word M_2	Synthetic M_3	Picture M_1	Real Word M_2	Synthetic M_3	Picture M_1	Real Word M_2	Synthetic M_3
Initial consonant E_1	jar can	cop sit	bup jop	jar can	cop sit	bup jop	jar can	cop sit	bup jop
	box ___ saw ___ man ___ dog ___	job ___ bad ___ dig ___ mud ___	cag ___ mon ___ dag ___ sig ___	box ___ saw ___ man ___ dog ___	job ___ bad ___ dig ___ mud ___	cag ___ mon ___ dag ___ sig ___	box ___ saw ___ man ___ dog ___	job ___ bad ___ dig ___ mud ___	cag ___ mon ___ dag ___ sig ___
Final consonant E_2	pin log	nap hill	med lup	pin log	nap hill	med lup	pin log	nap hill	med lup
	doll ___ cat ___ bed ___ mop ___	fun ___ big ___ fed ___ pet ___	rel ___ lon ___ kag ___ jit ___	doll ___ cat ___ bed ___ mop ___	fun ___ big ___ fed ___ pet ___	rel ___ lon ___ kag ___ jit ___	doll ___ cat ___ bed ___ mop ___	fun ___ big ___ fed ___ pet ___	rel ___ lon ___ kag ___ jit ___
Vowel E_3	cap sun	beg six	kip mot	cap sun	beg six	kip mot	cap sun	beg six	kip mot
	leg ___ fox ___ bat ___ pig ___	web ___ mat ___ not ___ run ___	hab ___ ped ___ tup ___ lig ___	leg ___ fox ___ bat ___ pig ___	web ___ mat ___ not ___ run ___	hab ___ ped ___ tup ___ lig ___	leg ___ fox ___ bat ___ pig ___	web ___ mat ___ not ___ run ___	hap ___ ped ___ tup ___ lig ___
Whole word E_4	cup hen	jet pit	rab mup	cup hen	jet pit	rab mup	cup hen	jet pit	rab mup
	top ___ rat ___ jug ___ fan ___	red ___ cut ___ wag ___ hop ___	ged ___ tig ___ rop ___ kas ___	top ___ rat ___ jug ___ fan ___	red ___ cut ___ wag ___ hop ___	ged ___ tig ___ rop ___ kas ___	top ___ rat ___ jug ___ fan ___	red ___ cut ___ wag ___ hop ___	ged ___ tig ___ rop ___ kas ___
Success Failure	on to T_1, M_2	on to T_1, M_3 OR BACK TO T_1, M_1	on to T_2, M_1 OR BACK TO T_1, M_2	on to T_2, M_2 OR BACK TO T_1, M_1	on to T_2, M_3 OR BACK TO T_1, M_2	on to T_3, M_1 OR BACK TO T_1, M_3	on to T_3, M_2 OR BACK TO T_2, M_1	on to T_3, M_3 OR BACK TO T_2, M_2	BACK TO T_2, M_3

pattern of success and failure produces his distinctive profile for diagnosis and instruction.

The starting point in the test design in Figure 4 is determined by the student's success in handling the synthetic words of IRAS. If he does moderately well on the *CVC* words in IRAS, he begins with verbal production of whole words; if he has experienced considerable difficulty with the *CVC* words in IRAS, he begins with identification of initial consonants. The sequencing of mini-tests within the multidimensional decoding tests is based on the student's success or failure on each mini-test. The tester moves the successful child toward increasingly difficult tasks, materials, and letter-sound environments. If the child fails, he is moved to easier tasks and materials. Because the items are designed for systematic variation along identifiable dimensions of difficulty, the analysis of the student's errors indicates the specific materials or tasks that pose problems.

We present the design in Figure 4 not for practical application—it is a research tool at present. However, we believe that the concept of systematic test design can be used informally in regular classroom settings for assessing children with specific problems.

Vocabulary. Success in handling vocabulary requires the reader to locate in memory one or more definitions for a word in a sentence. This ability allows the reader to state definitions, give synonyms, and recognize the appropriate or common usage of words. An in-depth assessment of vocabulary knowledge should measure not only whether the child "understands" a word, but also the breadth and depth of that understanding.

The study of vocabulary has lain dormant for some years. The classic studies focused on frequency of usage, typical age of entry of a word into the lexicon, association patterns, and the production-reception contrast (see Calfee and Drum 1978, for a brief overview and references). More recent studies build upon a firmer theoretical foundation and provide the potential for improving assessment by clarifying the appropriate structural paradigms for different categories of words (e.g., Miller and Johnson-Laird 1976). It is fairly obvious that defining words from different form classes (nouns, verbs, adjectives, and so on) places different demands on the student. What is less obvious is the existence of categories of words for which the structural similarities and distinctions are unique (e.g., verbs of motion, possession, and vision have very different conceptual structures).

Figure 4. Factorial test of consonant-vowel-consonant knowledge. (See facing page.)

By the design of the vocabulary test and the tasks used to measure vocabulary competence, we can examine individual differences in the structure of students' semantic fields and the ease with which different students gain access to standard and unusual definitions.

The assessment scheme we propose for detailed analysis of vocabulary knowledge is a factorial design akin to that for decoding. The factors for the design include the method of presenting the material, the nature of the task, and the character of the word to be defined. The first dimension covers the method of presentation (e.g., spoken words in isolation, spoken words in context, printed words in isolation, printed words in sentence context, and so on). The second dimension is the nature of the task, ranging from the easy task of choosing the correct alternative from an array of pictures, to the relatively difficult task of producing the definition itself. The third dimension is the nature of the words, which vary in form class, familiarity, abstractness-concreteness, length, and number of syllables. As in the case of the decoding test, the design permits a systematic examination of the conditions under which the student succeeds and fails. Entry into the test depends on performance on the vocabulary section of IRAS. The student is then given easier or more difficult tasks within the factorial structure, depending on his success or failure.

Sentence Understanding. The student's grasp of syntactical relations within the sentence is undoubtedly an important precursor to successful comprehension. While we know of no evidence that individual differences in syntactical competence per se are significant in distinguishing good and poor readers, there is evidence that the task of sentence comprehension may be difficult for some students (Mistler-Lachman 1974; Perfetti 1977; Perfetti and Hogaboam 1975).

The first problem confronting the researcher, diagnostician, or teacher is to specify what is meant by a sentence-understanding task as distinct from both the processes that feed into it (decoding and vocabulary) and the larger task of comprehension into which sentence understanding feeds. Within the framework of the independent process approach, it is important to ask about the process of sentence understanding, about the factors that uniquely influence it, and about the proper methods of measuring it.

Gough (1972) built a heuristic reading model around the notion that a primary task of the reader is to take a complete sentence, organize it into a meaningful thought, and then send it on to TPWSGWTAU ("The Place Where Sentences Go When They Are Understood"). Short-term memory is centrally involved in the process, it would appear. The child must hold the beginning of the word string in working memory, must continue to decode subsequent words, and then must have continual access to the stored representation of the beginning of the word string in order to integrate it with the later elements of the sentence. Automaticity, i.e., the ability to decode fluently and focus on meaning (LaBerge and Samuels 1974), becomes increasingly critical as sentence length and syntactic complexity increase.

The idea that a sentence is a thought seems a productive point of departure. What factors might influence the organization of a string of words into a thought? Certainly the first factor to be considered is the number of words in the string. The nature of short-term memory ensures that longer sentences will be more difficult to process than shorter sentences, other factors being held constant.

The structure of a sentence is also likely to be a powerful variable. However, the question remains as to which structural variables are the most promising candidates for investigation if we are to understand why a student is having trouble. At this point there is little guidance from theory or data. While some syntactical frames seem easier than others (Hunt 1970; Loban 1961), evidence for this assumption is based on averages over many students and thus reveals little about individual differences.

What are the structural variations that are differentially problematic for different kinds of students, and where might instruction make a difference? We don't have answers to these questions. However, one of the interesting features of the factorial test approach is that it provides useful data in a practical context. Thus, the tester can explore the effects of variation in syntactic factors for guidance in helping an individual student; the aggregate results may also help us to understand students in general. For instance, suppose it is thought that the familiarity of a sentence frame is an important factor. Then sentence frames like *Adj - N - V - Adj - N* (The brown fox ate the little rabbit) should be easy for all readers, whereas less familiar frames like *V - Adj - N - V - Adj - N* (Eating little rabbits pleases brown foxes) might cause special problems for some students. If we found such a result, it might give us insight about underlying mechanisms of understanding.

At this time, we are not able to recommend a detailed design for assessment of sentence comprehension. We see this area as in need of more thought and research if it is to be understood as a process apart from the other processes that feed into it and to which it contributes. We do see interesting ways of measuring the independent contribution of various processes. For instance, letter-sound regularity and vocabulary can be precisely controlled while assessing comprehension of short and long sentences. Decoding and vocabulary difficulty can be systematically increased, while sentence length is maintained as a constant, permitting us *to measure the limits of a child's handling of syntax in* developing a coherent thought. If the student has difficulty with a long sentence, yet can decode and understand words fluently in isolation, we know his difficulty must lie with remembering and integrating a substantial body of information.

Text Comprehension. Recent developments in case grammar and the extension of case grammar to propositional analysis have given us important tools to measure the cognitive processes in comprehension (Just and Carpenter 1977; Kintsch and Van Dijk 1978; LaBerge and Samuels 1977). The student's task in text comprehension is to read a string of connected sentences, organizing the information in a retrievable format. Both common sense and research evidence suggest that text comprehension is an independent process in the sense that it entails more than merely remembering a string of sentences. For instance, the number of propositions in a passage has been shown to influence the reader's ability to recall information from a passage (Kintsch and Keenan 1973; Kintsch, Kosminsky, Streby, McKoon and Keenan 1975), as has the hierarchical structure of propositions within a passage (Kintsch 1977; Meyer 1977; Thorndyke 1977).

Another significant development which has aided our understanding of text comprehension goes under the general heading of story grammar. Propositional analysis is fine grained, and builds one word upon the other. In fact, one must also consider the macro-structure of a text. Story grammars provide an analysis of the broader features of a type of prose that we commonly refer to as a "story" (Bower 1976; Mandler 1978).*

While there are several variations among researchers, the prototypic story has a grammatical structure of an introductory setting, one or more episodes, and a resolution. The episode can then be broken into a beginning (or initial event and complication), a reaction by the character to the complication, an attempt to deal with the situation, an outcome of the attempt, and a lead into the next episode or into the resolution of the entire story. Research on story grammar is still fairly new, but we do know that passages that conform to the prototype story grammar are easier to recall than passages that are incomplete or jumbled.

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*See P. A. Weaver and D. Dickinson, "Story Comprehension and Recall in Dyslexic Students," p. 157. *Editor.*

Our plans for the design of the comprehension test call for variation in vocabulary and sentence length to provide a link to the two previous stages. However, the chief variables of relevance to the comprehension process include the number of propositions as well as the structural complexity of the propositions. We are currently developing and trying out passages that vary systematically along these dimensions but we are finding the task more difficult than it had appeared to be.

A distinctive feature of the comprehension segment of our assessment system is the procedure used to measure understanding. The usual method has been to ask one or more "comprehension questions," varying in format (e.g., cloze test, multiple choice, or short answer) and substance (e.g., literal or inferential information, main idea or gist, and so on). However, we (along with other researchers) have been dissatisfied with questions created according to these specifications, because we do not think that they capture many of the significant features of the comprehension process.

Our analysis of the comprehension process suggests to us that two of the simplest and most appropriate questions for evaluating comprehension are, "What was the story (or paragraph or passage) about?" and "Tell me as much as you can about the story you just read." The *free recall* method is widely used in laboratory research with college students, but the limitations of this method for younger and less capable students seem obvious; the student may have comprehended far more than he can readily retrieve and produce, and he may not understand that the task calls for him to reproduce everything within his capability—and in a coherent, organized fashion! The practical limitations of the free recall method are also considerable—how is the tester to record and analyze the data of a free recall protocol?

We believe we have developed a procedure which overcomes these shortcomings to the benefit of both research and practice. The essence of the procedure is to use a story grammar in combination with the propositional analysis of the passage as a framework for recording the extent and structure of the student's recall, and to provide a source of cues for prompting the student for any residual information that remains *after* the initial spontaneous production.

We are still in the early stages of developing this approach, and it would be premature to go into much detail at the present time. Figure 5 illustrates the main features of the method used to record the student's recall, and the structural elements of story grammar and propositional analysis. Note the sequence of test questions, including the "prompts"

TASKS AND QUESTIONS

1.	SUMMARY:	Tell me about the story in just a few words or sentences
2.	RE-TELL:	Now tell me the whole story
3.	CUED PROMPTS:	(See specific questions)

Story Elements	Content*	Summary	Re-Tell	Cued	Cued Prompts
SETTING	______ - - - - - - - - - - -	___	___	___	(How did story start?)
BEGINNING a. Initiating event b. Complication	______ - - - - - - - - - - - - - - - -	___	___	___	(What happened first?[Before complication] Next?)
REACTION	______ - - - - - - - - - - -	___ ...	___ ...	___ ...	(How did ... feel? when [complication])
ATTEMPT	______ - - - - - - - - - - -	___	___	___	(What did ... do after [reaction]?)
OUTCOME	______ - - - - - - - - - - -	___	___	___	(What happened when ... [attempt]?)
RESOLUTION	______ - - - - - - - - - - -	___ ...	___ ...	___ ...	(What happened after [outcome] ...how did story end?)

* Solid lines indicate text--broken lines indicate propositional representation of text, e.g.:

BEGINNING a. Initiating event	Tom wanted to play ball. He wanted Ann to play with him. WANTED; Tom, X, Y X=PLAY; Tom, ball Y=PLAY ; Ann (PLAY): with him	

Figure 5. Sample response sheet for text comprehension segment of IRAS.

used to extract residual information. After the tester asks the first question which calls for an overview, the story elements are checked off serially as the student mentions them. When the detailed recall question is asked, story elements are again numbered according to order of recall, and any propositions included in the student's answer are checked off. Next, the tester goes back and asks probe questions for any elements not yet mentioned. These are by no means the only questions that could be asked; multiple-choice questions might be posed for details of individual propositions, and inter-element questions involving inferences could also be raised. However, the format in Figure 5 seems a reasonable starting point.

Two other jobs need to be completed in the comprehension section of IRAS. One is to refine the design of the reading materials. We have followed the usual practice of selecting materials that range over a graded progression from short, simple passages with easy vocabulary to longer and more complex passages with difficult words. It is clear that comprehension becomes poorer as the text becomes more difficult. However, since so many factors are confounded, it is impossible to state with any confidence what causes the decline in performance. We are devising passages that vary systematically in length, structural complexity, and vocabulary familiarity. For instance, one set of passages is moderately long, and relatively simple in propositional structure, but contains some passages with common words and other passages with rare words. Other sets of passages are longer or shorter, and have either plain or intricate propositional networks. By identifying the factors that affect performance, we can determine the conditions under which the student succeeds or fails and, thereby, gain insight into his intellectual mechanism and the instructional program that is likely to be beneficial. The student who can handle prose of any length or complexity as long as the vocabulary is fairly simple presents a very different profile than the student who can handle short prose of any sort but has problems with long passages.

The second task is to assess the recall protocols. A considerable amount of information is available from records like the one exemplified in Figure 5. One important measure is the total number of story elements recalled in any fashion; another is the percentage of propositions mentioned in the protocol. We have also considered measures of the order of recall, and the amount recalled during each stage of questioning. At present, we can only speculate about the empirical and practical value of these various measures; we lack a theoretical framework for deciding among these measures.

Pattern Analysis by Contrast Scores

We conclude the description of IRAS with a discussion of the scoring procedure proposed for the system. The basic approach is to present the results in the form of baseline averages and contrast scores about these baselines. A contrast score is a standardized difference between performance under two sets of conditions (Dayton 1970). For instance, one might compute the difference score between performance in reading time on passages with high versus low propositional density. Contrast scores are most frequently used to test specific hypotheses in the analysis of variance, but they may also be used to describe the patterns of specific strength and weakness for an individual student. Techniques exist for determining the reliability of these scores, for establishing their independence, and for measuring their validity against various criteria (Calfee 1976; Calfee and Drum, in press).

Figure 6 provides an illustration of the approach applied to a subset of the measures from the assessment system. For each of the four components in Figure 6, we have scores for the two levels of a primary factor; these scores are averages over other factors in the design of that component. We assume that the scores are primary measures (e.g., *pronunciation* for decoding, *correct definition* for vocabulary, and so on), and that they have been converted to standard form (mean of 0, standard deviation of 1).

The profile for a typical student is shown at the top of Figure 6. The solid line is the average for the population of students, and the dashed lines are one standard deviation (σ) above and below average. The solid dots are the average standard scores for the student on each component—he is about one-half of a standard score below average in decoding and reading comprehension, and is one-third to one-half of a standard score above average on vocabulary, sentence understanding, and listening comprehension. The "x's" denote performance for the different levels of the primary factor for each component. For instance, the student in this example does fairly well in decoding regularly spelled words, but has a great deal of trouble with irregular words.

The purpose of contrast scores is to emphasize the patterns in performance. The basic procedure operates as follows (refer to lower half of Figure 6). First we define the student's overall level of performance for all test components. This measure, which is the average of all the test scores, provides the baseline reference point for how well the student reads in general. Our illustrative student, for instance, does a bit better than the average student, if we consider the general level of performance over all the tests. After the baseline is established a number of specific contrasts or differences are then examined. These differences are planned when we design the test, and hence are *a priori* contrasts. Our design was built around the selection of test components as well as around the selection of factors, and so two kinds of contrasts are measurable. Thus, the Decoding versus Oral Language contrast reflects the student's relative strength in decoding skills (Decoding and Reading Comprehension) as contrasted

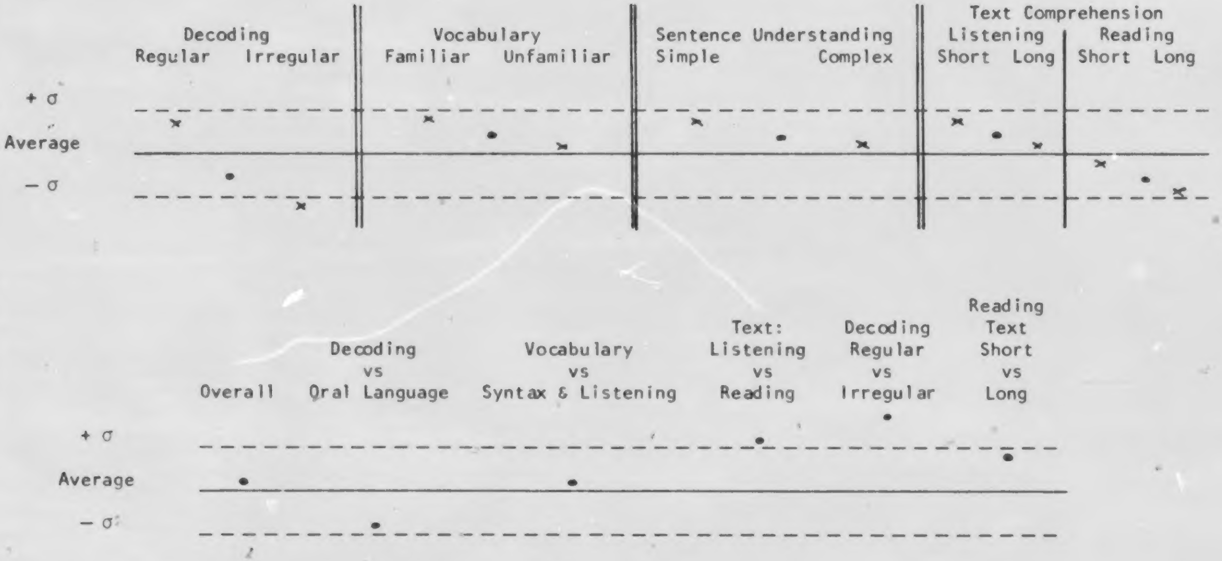

Figure 6. Example of raw score and contrast score profiles for illustrative student.

with oral language skills (Vocabulary, Sentence Understanding, and Listening Comprehension). As an example of a factor contrast, we can see that on the Decoding test regular words are handled with relative ease in contrast with irregular words.

Converting raw scores to contrast scores has a number of advantages. For one thing, contrast scores simplify the information as it is presented to the teacher. Each contrast score at the bottom of Figure 6 is a statistically independent source of information, in the sense that there is no *a priori* reason why the scores should be correlated. Hence, the teacher (or researcher) can examine the contrast scores one at a time, rather than scan the entire set of raw scores in search of distinctive patterns.

A second important feature of contrast scores is that reliability can be determined for each specific contrast score. It is easy to be misled about the trustworthiness of patterns in a set of test scores when you are relying on your "eyeball." The reliability of a pattern depends in a complex way on the variability in each score and the correlation between scores—it is extremely difficult to judge the consistency of a pattern by simply scanning the scores. Factor analysis is an alternative approach to pattern detection, but in our experience teachers (and researchers) find it difficult to use factor scores in practical applications.

Assessment and Instruction

Depending on the level of reading competence chosen as "reasonable," from five to twenty-five percent of the population cannot read well enough to meet their needs for work, recreation, and personal development. Many educators believe that one way to improve the situation is to match reading instruction more directly to the needs and strengths of the individual student. To do this, the teacher needs to assess continuously what the student has learned. Precise, up-to-date information on the student's skills and knowledge allows the teacher to make sensible decisions about where to concentrate the teaching efforts with that child.

An assessment system like IRAS shows how to diagnose, observe, evaluate, and prescribe all at once. It provides an intellectual framework which allows the teacher to focus on one skill at a time, which directs systematic variation in testing conditions, and which aids in record keeping. Using this framework, the teacher can select and organize content appropriate to instruction in specific skills (Calfee, Drum and Arnold, 1978).

We believe that the teacher will benefit from the concept of exploring factorial variations in test conditions as a way of exploring the workings of the student's head. Just as young children can be trained to apply factorial principles to problem solving (Anderson 1975), systematic variation as a means of discovering what a student knows about reading is a problem-solving exercise *par excellence* for the teacher (Calfee, Drum and Arnold 1978). The multi-dimensional test of reading skills provides the intellectual tools for the teacher to become a more effective problem solver in diagnosis and prescription. The system provides a model for thinking about reading which can improve day-to-day classroom instruction. We believe the system has considerable potential for teacher training and in-service programs. We have found this approach to be helpful in a number of projects where teachers were dealing with students from low-income neighborhoods, and we are optimistic that it will be of particular value in special education projects.

References

Anderson, R.C. 1975. Can first graders learn an advanced problem solving skill? *J. Educ. Psychol.* 56:283–294.

Anderson, R.P., Halcomb, C.G., and Doyle, R.D. 1973. Measurement of attentional deficits. *Exceptional Child* 39:534–539.

Benton, A.L. 1975. Developmental dyslexia: Neurological aspects. *In* W.J. Friedlander (ed.). *Advances in Neurology.* Vol. 7. New York: Raven Press.

Bower, G.H. 1976. Experiments on story understanding and recall. *Quart. J. Exper. Psychol.* 28:511–534.

Bush, W.J. and Waugh, K.W. 1976. *Diagnosing Learning Disabilities.* (2nd ed.) Columbus, Ohio: Merrill Publishing.

Calfee, R.C. 1975. Memory and cognitive skills in reading acquisition. *In* D. Duane and M. Rawson (eds.). *Reading, Perception and Language.* Baltimore: York Press.

Calfee, R.C. 1976. Sources of dependency in cognitive processes. *In* D. Klahr (ed.). *Cognition and Instruction.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Calfee, R.C. and Calfee, K.H. 1977. Interactive reading-assessment system (IRAS). Unpublished manuscript. Stanford University.

Calfee, R.C. and Drum, P.A. 1978. Learning to read: Theory, research, and practice. *Curriculum Inquiry* 8(3):183–249.

Calfee, R.C. and Drum, P.A. In press. How the researcher can help the reading teacher with classroom assessment. *In* L.B. Resnick and P.A. Weaver (eds.). *Theory and Practice of Early Reading.* Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

Calfee, R.C., Drum, P.A. and Arnold, R.D. 1978. What research can tell the reading teacher about assessment. *In* S.J. Samuels (ed.). *What Research Has To Say to the Teacher of Reading.* Newark, Delaware: International Reading Association.

Calfee, R. C., Fisk, L. W. and Piontkowski, D. 1975. "On-off" tests of cognitive skills in reading acquisition. *In* M.P. Douglass (ed.). *Claremont Reading Conference 39th Yearbook 1975.* Claremont, California: Claremont Graduate School.

Calfee, R.C. and Juel, C.L. 1978. How theory and research on reading assessment can serve decision-making. *In* R. Beach and P.D. Pearson (eds.). *Perspectives on Literacy: Proceedings of the 1977 Perspectives on Literacy Conference.* Minneapolis: College of Education, University of Minnesota.

Calfee, R.C., and Venezky, R.L. 1969. Component skills in beginning reading. *In* K.S. Goodman and J.T. Fleming (eds.). *Psycholinguistics and the Teaching of Reading.* Newark, Delaware: International Reading Association.

Carroll, J.B. 1978. Psycholinguistics and the study and teaching of reading. *In* S.W. Pflaum-Connor (ed.). *Aspects of Reading Education.* Berkeley, California: McCutchan.

Chalfant, J.C. and King, F.S. 1976. An approach to operationalizing the definition of learning disabilities. *J. Learning Disabilities* 9(4):34–39.

Chall, J.S. 1967. *Learning to Read: The Great Debate.* New York: McGraw-Hill.

Chall, J. S. 1970. Learning and learning to read: current issues and trends. *In* F. A. Young and D.B. Lindsley (eds.). *Early Experience and Visual Information Processing in Perceptual and Reading Disorders.* Washington, D.C.: National Academy of Sciences.

Cheyney, F.R. 1972. The informal reading inventory: How to construct it, how to use it. *In* S.L. Sebesta and C.J. Wallen (eds.). *Readings on Teaching Reading.* Chicago: Science Research Associates.

Coles G.S. 1978. The learning-disabilities test battery: Empirical and social issues. *Harvard Educ. Rev.* 48(3):313–339.

Dayton, C.M. 1970. *The Design of Education Experiments.* New York: McGraw-Hill.

Doyle, R.B., Anderson, R.P. and Halcomb, C.G. 1976. Attention deficits and the effects of visual distraction. *J. Learning Disabilities* 9(1):59–65.

Dykman, R.A., Ackerman, P.T., Clements, S.D. and Peters, J.E. 1971. Specific learning disabilities: An attentional deficit syndrome. *In* H.R. Myklebust (ed.). *Progress in Learning Disabilities,* Vol. II. New York: Grune and Stratton.

Flavell, J.H. 1977. Metacognitive development. Paper presented at the NATO Advanced Study Institute on Structural/Process Theories of Complex Human Behavior, Banff, Alberta, Canada.

Gough, P.B. 1972. One second of reading. *In* J.F. Kavanaugh and I.G. Mattingly (eds.). *Language by Ear and by Eye: The Relationships Between Speech and Reading.* Cambridge, Massachusetts: The MIT Press.

Gray, W.S. 1967. *Gray Oral Reading Test* (rev. ed.). Indianapolis: Bobbs-Merrill.

Hagen. A.J., Jongeward, R.H., Jr. and Kail, R.V., Jr. 1975. Cognitive perspectives on the development of memory. *In* H. Reese (ed.) *Advances in Child Development and Behavior,* Vol. 10. New York: Academic Press.

Hallahan, D.P. and Cruickshank, W.M. 1973. *Psycho-educational Foundations of Learning Disabilities.* Englewood Cliffs, New Jersey: Prentice-Hall.

Hallahan, D.P., Kaufman, J.M. and Ball, D. 1973. Selective attention and cognitive tempo of low achieving and high achieving sixth grade males. *Perceptual Motor Skills* 36:579–583.

Hammill, D., Goodman, L. and Wiederhold, J.L. 1974. Visual-motor processes: Can we train them? *Reading Teacher* 27(5):469–480.

Hunt, K.W. 1970. Syntactic maturity in schoolchildren and adults. *Monographs* 35:1.

Johnson, M.S. 1957. Factors related to reading disability. *J. Exper. Educ.* 26:1–26.

Just, M. and Carpenter, P. (eds.). 1977. *Cognitive Processes in Comprehension.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Katz. P.A. and Deutsch, M. 1967. Auditory and visual functioning and reading achievement. *In* M. Deutsch (ed.). *The Disadvantaged Child.* New York: Basic Books.

Kender, J.P. 1970. Informal reading inventories. *Reading Teacher* 24:165–167.

Kintsch, W. 1977. On comprehending stories. *In* M.A. Just and P. Carpenter (eds.). *Cognitive Processes in Comprehension.* Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

Kintsch, W. and Keenan, J. 1973. Reading rate and retention as a function of the number of propositions in the base structure of sentences. *Cognitive Psychol.*, 5:257–274.

Kintsch, W., Kozminsky, E., Streby, W.J., McKoon, G., and Keenan, J.M. 1975. Comprehension and recall of text as a function of content variables. *J. Verbal Learning and Verbal Behav.* 14:196–214.

Kintsch, W. and van Dijk, T.A. 1978. Toward a model of text comprehension and production. *Psychol. Rev.* 85(5):363–394.

Kleuver, R. 1971. Mental abilities and disorders of learning. *In* H.R. Myklebust (ed.). *Progress in Learning Disabilities*, Vol. II. New York: Grune and Stratton.

Koppitz, E.M. 1976. Bender Gestalt test, visual-aural digit span test, and reading achievement. *J. Reading Disabilities* 9:154–157.

LaBerge, D. and Samuels, S.J. 1974. Toward a theory of automatic information processing in reading. *Cognitive Psychol.* 6:293–323.

LaBerge, D. and Samuels, S.J. 1977. *Basic Processes in Reading: Perception and Comprehension.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Lapp, D. and Flood, J. 1978. *Teaching Reading to Every Child.* New York: Macmillan.

Loban, W. 1961. Language Ability in the Middle Grades of the Elementary School. Report to the U.S. Office of Education, SAE 7287.

Lohnes, P.R., and Gray, M.M. 1972. Intelligence and the cooperative reading studies. *Reading Res. Quart.* 7:466–476.

Luria, A.R. 1961. *The role of speech in the regulation of normal and abnormal behavior.* New York: Liveright.

Mandler, J.M. 1978. A code in the node: The use of a story schema in retrieval. *Discourse Processes* 1:14–35.

Mann, L. and Phillips, W.A. 1967. Fractional practices in special education: A critique. *Exceptional Children* 33:311–317.

Meyer, B.J.F. 1977. The structure of prose: Effects on learning and memory and implications for educational practice. *In* R.C. Anderson, R.J. Spiro and W.E. Montague (eds.). *Schooling and the Acquisition of Knowledge.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Miller, G.A. and Johnson-Laird, P.N. 1976. *Language and perception.* Cambridge, Massachusetts: Belknap Press.

Mistler-Lachman, J.L. 1974. Depth of sentence comprehension and sentence memory. *J. Verbal Learning and Verbal Behavior* 13:98–106.

Perfetti, C.A. 1977. Language comprehension and fast decoding: Some psycholinguistic prerequisites for skilled reading comprehension. *In* J.T. Guthrie (ed.). *Cognition, Curriculum, and Comprehension.* Newark, Delaware: International Reading Association.

Perfetti, C.A. and Hogaboam, T. 1975. The effects of words experience on decoding speeds of skilled and unskilled readers. Paper presented at the annual meeting of the Psychonomics Society, Denver, Colorado.

Piontkowski, D. 1976. Clinical assessment of beginning reading skills. Paper presented to Workshop on Developing Efficient Response-Sensitive Tests of Reading Skills, 21st Annual Convention International Reading Association, Anaheim, California.

Piontkowski, D. and Calfee, R.C. In press. Attention in the classroom. *In* G. Hale and M. Lewis (eds.). *Attention and the Development of Cognitive Skills.* New York: Plenum.

Potter, T.C. and Rae, K. 1973. *Informal Reading Inventories.* Newark, Delaware: International Reading Association.

Ross, A.O. 1976. *Psychological Aspects of Learning Disabilities and Reading Disorders:* New York: McGraw-Hill.

Senf, G.M. and Freundl, P.C. 1971. Memory and attention factors in specific learning disabilities. *J. Learning Disabilities 4:94–106.*

Silvaroli, N.J. 1973. *Classroom reading inventory.* Dubuque, Iowa: William C. Brown Company.

Sternberg, S. 1969. The discovery of processing stages: Extensions of Donder's method. *In*

W.G. Koster (ed.). *Attention and Performance II.* Amsterdam: North-Holland Publishing.

Sykes, D.H., Douglas, V.I. and Morgenstern, G. 1973. Sustained attention in hyperactive children. *J. Child Psychol.* 14:213–220.

Thorndyke, P.W. 1977. Memory for narrative discourse. *Cognitive Psychol.* 19(1):77–10.

Torgesen, J.K. 1977. Memorization processes in reading-disabled children. *J. Educ. Psychol.* 69(5):571–578.

Torgesen, J.K. and Goldman, T. 1977. Rehearsal and short-term memory development in the reading disabled. *Child Development* 48:56–60.

U.S. General Accounting Office. 1977. Learning disabilities: The link to delinquency should be determined, but schools should do more now. Report to the Congress by the Comptroller General of the United States (GGD–76–97). Washington, D.C.: U.S. General Accounting Office.

Venezky, R.L. 1976. The curious role of letter names in reading instruction. *Visible Language* 9:7–23.

Story Comprehension and Recall in Dyslexic Students

Phyllis A. Weaver and *David K. Dickinson*

Harvard University

This article is an extension of work reported earlier in this journal (Weaver 1978). In that paper, we echoed the commonly suggested need for examining reading difficulties in relation to higher-order language processes and offered a schema-theoretical framework for guiding such an examination. In this article we report the findings and implications of an empirical investigation into the characteristics of story recall abilities in students with dyslexia or severe reading disabilities.

Summary of Theoretical Background

Almost by definition we know that disabled readers do not recognize a sufficient number of words accurately and other words rapidly enough to permit adequate comprehension and recall of connected text. We do not know, however, the extent to which faulty word recognition contributes to inadequate understanding and recall, nor do we know which problems in higher level comprehension and recall impede accurate and rapid word recognition. Our work is guided by the premise that reading is a complex network of interacting processes and, therefore, skill and skill deficiencies at one level will undoubtedly affect performance at other levels. (For discussion of interactive processes in reading see, for example, Frederiksen and Weaver 1979; Lesgold and Perfetti 1978; and Rumelhart 1977.)

Our emphasis here is on the nature of story recall among certain types of dyslexic students (differing in age and verbal-performance IQ

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score patterns) relative to that of a comparison group of developmentally normal students. A schema-theoretic approach to story comprehension and recall provides a basis for the comparison. Briefly, schema theorists suggest that comprehension and recall of stories results from an interaction of the story information with the existing cognitive structures which readers or listeners bring to bear on the stories. These cognitive structures are referred to as story schemata, and they represent the generic structures and concepts of stories. As individuals read or hear stories, their schemata are activated and serve to organize, interpret, store in memory, and later recall specific story content.

Several psychologists have developed story grammars which delineate elements common to stories and a set of rules for describing the interrelations among elements (Mandler and Johnson 1977; Rumelhart 1975; Stein and Glenn 1975, 1979; Thorndyke 1977). And there is a growing body of literature related to story grammars that charts developmental changes in story understanding and recall (e.g., Brown and Smiley 1977; Kintsch 1977; Stein and Glenn 1979). We proposed in our earlier work that inadequate story schemata or the inability to use them may be related to the reading problems that dyslexic individuals exhibit (Weaver 1978, pp. 104-105), and our exploratory investigation was designed to consider this proposal.

Summary of Stein and Glenn's Grammar Categories and Selected Developmental Findings

Stein and Glenn (1975, 1979) proposed and tested validity of a story grammar (adapted from Rumelhart's 1975 scheme), and we have used their approach for our work. Their grammar has seven categories: (1) *major setting* which includes character introduction; (2) *minor setting* which includes description of story context; (3) *initiating events* which are natural occurrences that produce a change of state in the environment or actions performed by characters if they cause response in another character; (4) *internal responses* refer to goals, plans, and thoughts of the characters; (5) *attempts* include characters' overt actions to obtain a goal; (6) *direct consequences* express whether or not the goal is attained; and (7) *reactions* include a character's feelings or thoughts about attaining or not attaining the goal or how this outcome affects another character.[1]

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[1] We are not always in agreement with Stein and Glenn's assignment of story statements to grammar categories, and we sometimes question their boundaries between categories. However, because we wished to make general comparisons between Stein and Glenn's findings and our own, we used both their stories and grammatical analyses.

Findings. Stein and Glenn (1979) examined development of recall and organization of story content by comparing first graders (mean age 6.5) and fifth graders (mean age 10.6) on four stories. They used their findings to examine the usefulness of their story grammar as a methodological tool, and they tested the validity of categorical distinctions of the grammar as predictors of recall. The 48 students were from an upper middle class school, and although the authors did not report reading scores, Stein confirmed (personal communication) that the 24 first and 24 fifth graders were reading on the average, at least at or, without doubt, above the expected level.

Except in the amount of information recalled, Stein and Glenn did not find striking developmental differences. Overall, fifth graders recalled significantly more statements from each story and significantly more statements from the *internal response* category than did the first graders. Otherwise the relative salience of the other categories was the same for first and fifth graders. For both, *major settings* were the best remembered and *initiating events* and *direct consequences* were the next best remembered categories in all four stories. *Attempts* were ranked either fourth or fifth and *internal responses* and *minor settings* were always remembered least well, with rank varying from fifth to seventh position depending on the story. Both first and fifth graders were quite sensitive to event sequence; there were very few errors of temporal order in any of the stories.

Methodology

Student Selection and Characteristics

The students in our study were 26 boys attending a school for students who are diagnosed as dyslexic, or as having specific language difficulty. From a total student population of approximately 150, the parents of 70 consented to their children's participation. From this group we selected the 35 students who met our age and IQ criteria. The two age groups of interest to us were 9.0 to 11.11 years old and 13.0 to 15.11 years old. Although there was no ceiling set for IQ, a WISC-R full scale IQ score of 95 was the lower limit. Of these 35 students, 3 were eliminated because of peculiarities noted in their records, either extreme distractibility or indications of emotional problems. Unfortunately, due to difficulties in our audiorecording equipment, we lost data from six students, and these also had to be eliminated. Thus, our final sample size was 26.

In addition to differences related to age, we investigated a verbal-performance discrepancy on the Weschler Intelligence Scale for Children

(WISC-R) and its relation to story recall (see Weaver 1978, pp. 108-109). Using existing WISC-R IQ scores, the students were grouped by age and according to verbal-performance patterns in the following manner: one group had verbal IQ scores nine points or more higher than performance (V > P); the second group had verbal IQ scores nine points or more lower than performance IQ (V < P); and the third group had verbal and performance IQ's that were less than nine points discrepant (V =P).

Table 1 shows the average number of years students were below their expected reading level, and it reports these scores by age and verbal-performance IQ discrepancy. The reading discrepancy scores are only approximate; the school is ungraded, so grade levels were assigned, based on students' ages. Also we used an existing test score (paragraph meaning subtest, Stanford Achievement Test); therefore, we cannot attest to uniformity in administration. Table 2 reports mean WISC scores by IQ score discrepancies. Because preliminary analyses revealed age to be relatively uninformative, except as it was related to IQ discrepancy, and IQ discrepancy to be much more informative and predictive of certain variables of interest, the scores in this table are collapsed across age.

Table 1
Mean Reading Score Discrepancy by
Age and Verbal-Performance IQ Discrepancy Group[a]

	IQ			
Age	V > P	V = P	V < P	Total
Younger (*M* = 10.3)	1.3 (5)[b]	.9 (6)	2.5 (1)	1.2 (12)
Older (*M* = 13.9)		2.6 (6)	2.3 (8)	2.4 (14)

[a] reported in years and months below expected reading grade level
[b] number of observations per cell

Several aspects of Table 1 and Table 2 are worthy of mention. First, there are no older students in the V > P group (in contrast with five younger ones in the group) and only one younger student in the V < P group (in contrast with eight older students in the group). This pattern is consistent with other findings (see, for example, Mattis, French and Rapin 1975; Roit 1977) which suggest that perceptual-motor problems (often associated with lower performance IQ scores) are more prevalent in younger students, whereas language-related problems persist or become apparent with increasing age. Second, older students on the average are an additional year or more behind in reading comprehension compared to the younger students. Third, it is important to note from Table 2 that average full scale IQ is equivalent across IQ discrepancy groups, and there is no variance in the V = P group with respect to verbal, performance, and full scale IQ. Finally, it is interesting to note that for both V > P and V < P groups, the average discrepancy is about 20 points.

Materials and Procedures

The four stories we used are those in Stein and Glenn (1979). We calculated their readability levels, using the Spache Formula, and they ranged from 2.3 to 3.3, with an average of 2.75. The students in our study listened to the experimenter tell two stories and then performed a backward counting masking task. They then were asked to retell the stories just as they heard them. The procedure was repeated for the second pair of stories. Order of presentation of the two pairs was counterbalanced, and the procedure was audiorecorded.

Table 2
Mean WISC IQ Scores by Verbal-Performance Discrepancy

	IQ Discrepancy		
IQ	$V > P^a$	$V = P^b$	$V < P^c$
Verbal	121	106.4	100.2
Performance	98	106	120.1
Full Scale	111	106.3	110.1

[a] $n = 5$
[b] $n = 12$
[c] $n = 9$

Results and Discussion

Accuracy

All story recall protocols were scored for total number of accurately recalled categories. We adhered to Stein and Glenn's criterion for accuracy; that is, preservation of the semantic information in that category regardless of whether or not it was recalled in the original syntactic structure. Thus a category was considered to be recalled accurately if it was in verbatim or paraphrase form, or if plausible modifiers, conjunctions and so on were added or deleted. (Stein and Glenn scored 36 of our 104 protocols and the percentage of agreement between the scores was .97.)

The total number of category statements was converted to a proportion score, and mean proportion scores were obtained.

Mean proportion of categories recalled between younger and older disabled readers were compared using one-way analysis of variance (ANOVA). There were no significant age differences either for any single story or for all stories taken together. Furthermore, when we compared Stein and Glenn's reported mean proportion of categories recalled by normal fifth graders (mean age 10.6) with our younger disabled readers (mean age 10.3), who are also the V > P students (mean verbal IQ = 121, mean full scale IQ = 111), we find them to be virtually the same for the individual stories and exactly the same for the four stories taken together (mean proportion recalled = .57). Therefore, it appears that the younger and more verbally intelligent reading-disabled students recall as much from stories, in terms of story grammar categories, as Stein and Glenn's fifth graders who are likely to be above average readers.

Category Salience

To determine, the relative salience of each category in the story grammar to overall story structure, we calculated the proportions of accurately recalled statements within a category, summed these across stories, and rank-ordered them. In Table 3 we summarize these data by IQ discrepancy group. In all cases students in the V > P group recalled more than those in the V < P group. Planned comparisons revealed that these differences were significant in the *major setting, direct consequence,* and *minor setting* categories as well as in the average of all seven categories.

That the V < P group recalled proportionately less than the V > P group in categories which normal readers remembered most often (*major setting* and *direct consequence*) and least often (*minor setting*) is consistent with the findings of Smiley, Oakley, Worthen, Campione, and Brown (1977). They noted that their group of seventh grade poor readers was less sensitive than good readers to the relative importance of various components of texts. It appears, then, that the V < P group of disabled readers, but not the V > P group, do have inadequately developed schemata for stories insofar as the relative salience of grammar categories reflects an adequate ideal story schema.

Despite the differences in quantity of recall, the rank order of categories is highly similar across IQ discrepancy groups. Table 3 indicates that the first four categories are perfectly correlated in all three groups, and the last three categories always are ranked in the last three positions. This rank ordering is virtually the same as the one Stein and Glenn obtained

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Table 3
Mean Proportion of Accurate Recall Among
Disabled Readers by Category for IQ Discrepancy Groups

	IQ Discrepancy		
Category	V > P	V = P	V < P
Major setting	1.00	.89	.93[a]
Direct consequence	.93	.81	.71[b]
Attempt	.75	.65	.60
Initiating event	.62	.57	.59
Reaction	.47	.41	.46
Internal response	.44	.42	.38
Minor setting	.46	.33	.24[c]
TOTAL	.59	.53	.49[d]

[a] $p < .03$ (V > P with V = P + V < P)
[b] $p < .001$ (V > P with V < P)
[c] $p < .01$ (V > P with V < P)
[d] $p < .05$ (V > P with V < P)

from their first and fifth graders. Therefore, regardless of age, reading ability, or verbal-performance IQ discrepancy, the various story grammar categories have virtually the same relative order of importance in recall.

Results of An Alternative Scoring System

The Stein and Glenn study was designed to test the validity of story grammar category distinctions as predictors of recall. But the presence or absence of categories in story recall does not reveal specific characteristics of the information recalled. A nine category scoring scheme was developed (by Dickinson) to capture the nature of information omitted and included in recall protocols. The units of information in the scheme are sentences or propositions, phrases, and single words. The nine categories are listed and briefly described.

1. *Verbatim recall* (VB) includes exact or nearly exact repetition, synonyms (e.g., "supper" for "dinner"), and substitutions of pronouns for nouns or vice versa.
2. *Major inferences* (MAJINF) include added sentences or propositions that are not directly implied but which fit the story line.

3. *Minor inferences* (MININF) include changes in words or phrases involved in creating paraphrases.

4. and 5. *Added information* (ADDINFO) and *less information* (LESS-INFO) include single-word modifiers or phrases added to or omitted from a sentence which is otherwise recalled verbatim.

6. and 7. *Added coherence* (ADDCOH) and *less coherence* (LESS-COH) include the addition of temporal and causal markers not stated or the omission of those which are explicitly stated in the story.

8. *Forgotten information* (FORGOT) includes the omission of an entire sentence or proposition.

9. *Wrong information* (WRONG) includes factual errors at the phrase or word level and the addition of sentences which do not fit the story and are not implied.

All the reading-disabled students' protocols and twelve fifth-grade normal readers' protocols were rescored according to the Dickinson classification. The total number of instances of each response type was converted to a proportion score, and these were combined across stories.

Table 4 presents the mean proportion scores and standard deviations by response types comparing the total group of disabled readers (mean age = 12.1) with the twelve normal fifth graders. Results of student's "t" tests indicate that the groups are significantly different in all response types except that of added information. Examining rank orders of response types (i.e., by reading down the columns in Table 4) reveals that these are highly similar between groups, with four types sharing the exact rank and the other five types no more than two positions different in rank. These two findings taken together make it tempting to suggest that although the groups are quantitatively very different, they bear a quite striking qualitative resemblance.

Several clusters of response types shown in Table 4 are interesting to compare. Examining information forgotten and wrong information reveals that although the normal and disabled groups differ significantly, these response types hold the same rank order for both groups. Both omit a large proportion of whole sentences, and neither group produces much wrong or false information. This would indicate that, at least at a superficial level and for these stories, the total group of reading-disabled students does not exhibit a lack of comprehension of the events in the stories.

The category of verbatim recall reveals that normal readers produce twice as much information in verbatim form compared to the disabled

Table 4
Mean Total Proportion of Response Types
for Normal and Disabled Readers

Response	Disabled		Normal	
Type	*M*	*SD*	*M*	*SD*
FORGOT	36.71	8.8	29.03[a]	9.6
LESSINFO	6.42	2.2	6.68[b]	2.7
MININF	8.14	2.7	13.00[c]	1.9
VB	7.19	3.2	13.32[b]	6.6
LESSCOH	6.42	2.2	3.80[a]	1.9
MAJINF	4.36	2.6	2.43[b]	1.7
ADDCOH	3.64	1.2	5.33[a]	2.4
ADDINFO	3.22	2.0	3.20[d]	1.7
WRONG	1.80	2.0	.63[b]	.6

[a] $p < .05$
[b] $p < .01$
[c] $p < .001$
[d] $p = \text{ns}$

readers. It is possible that normal, more than disabled, readers understand and can respond to the instruction, "tell me the story *exactly* as you remember it." We think this is less likely than the more general explanation that good readers are typically better at verbal memory tasks than poor readers (Perfetti and Goldman 1976; Vellutino 1977). We cannot say whether normal readers store information in verbatim form in working memory and reproduce it in recall (an unlikely possibility), or whether they store some schematic representation of sentences and then infer the specifics at the time of recall.

Comparison of *major* and *minor inference* categories shows that disabled readers make more major inferences but fewer minor inferences than normal readers. A major inference occurs when entire sentences are added or replaced. We know that the disabled group forgets more, but we also know that what they do remember is fairly accurate and well-structured. Perhaps they do not encode or forget certain propositions, but at the time of recall they know information is missing, make inferences, and supply plausible replacements. If this is so, then the disabled readers in our sample have developed a rather adaptive strategy for their well-documented memory difficulties. The *minor inference* category is reserved for changed words and phrases and these are very similar to the original text versions. It could be that these responses, like the verbatim, reflect a generally better verbal ability among the better readers.

Finally, it is interesting to compare the coherence categories, those where temporal and causal markers are added or omitted. Normal readers add significantly more words that explicate the temporal order and causal relations in text. These additions may reflect better comprehension of the story which, in turn, results in a more informative representation of the story. In any case, they add cohesion to narratives and probably make texts more memorable by providing specific relational markers. That disabled readers omit twice as many existing markers as good readers gives additional evidence that they fail to understand the connections indicated by these markers More direct examination of the theoretical and practical significance of these results may be fruitful.

Results of Rescoring Comparing IQ Discrepancy Groups. In our next set of analyses we compared the three IQ discrepancy groups on our nine response categories. Table 5 presents the findings of these comparisons. It is striking to note that in comparing frequency of occurrence of response types, five response types share the same rank order in all three groups, and in the remaining four types there are always two of the three groups at the same rank. Again, regardless of how we group students they make qualitatively similar responses.

Table 5
Mean Proportion of Response Types
for Four Stories by IQ Discrepancy Group

Response Types	V > P	V = P	V < P
FORGOT	32.38	37.01	38.71
VB[a]	10.67	6.37	6.36
LESSINFO	8.95	8.53	8.82
MININF	7.61	8.18	8.40
LESSCOH	6.76	6.14	6.62
MAJINF	5.03	3.60	5.00
ADDCOH	3.34	3.85	3.51
ADDINFO	3.17	3.38	3.02
WRONG	1.18	1.86	2.05

[a] $F(2, 23) = 4.86$, $p < .02$

The only response type that distinguishes among the three IQ discrepancy groups is *verbatim recall*. There were also significant differences in *verbatim recall* in the analysis comparing fifth grade normal readers with the total sample of disabled readers. In *verbatim recall*, the V > P group remembers much more than either other group, but the V = P and V < P groups do not differ by much.

The findings of no significant differences among IQ groups for other response types may be due to large within IQ discrepancy group variance. In other words, there are greater individual differences in response patterns, and these apparently are not related to verbal-performance IQ discrepancy.

Bannatyne (1968) suggested that the WISC scores of dyslexic children are more meaningful and statistically valid when the subtests are recategorized according to a more fine-grained scheme than verbal-performance distinctions. Bannatyne's scheme was altered (Bannatyne 1974) in response to an article by Rugel (1974), and the four categories are: (1) spatial ability (picture completion, block design, object assembly); (2) verbal conceptualizing ability (comprehension, similarities, vocabulary); (3) sequencing ability (digit span, arithmetic, coding); and (4) acquired knowledge (information, arithmetic, vocabulary). Several studies have been conducted using these categories (see Rugel 1974, for review) and the findings are generally consistent. The mean spatial score is significantly higher than the mean conceptual score, and the conceptual score was higher than either the sequential score or acquired knowledge score.

We reclustered the WISC scores of our 26 students according to Bannatyne's 1974 scheme and carried out regression analyses to determine the extent to which these subscores predicted our various response types. Three relationships were significant. The sequential cluster was highly predictive ($R^2 = .52$) of the *less coherence* response type, and this relationship was significant at the $p < .02$ level. The verbal conceptualizing category significantly predicted verbatim recall, $R_2 = .58$, $F(3, 19) = 8.76$, $p < .001$. The acquired knowledge score also significantly predicted verbatim recall ($R^2 = .38$) but the relationship was not as strong, $F(3, 18) = 3.75$, $p < .05$.

This reanalysis is not much more revealing than those carried out using the verbal-performance discrepancy. The importance of the verbatim recall response type was confirmed. Verbatim recall appears to be related, as we have suggested, to verbal ability (verbal conceptualizing, in this case) and also to a set of subtests that reflect acquired knowledge. Students who tend to omit causal and temporal markers (*less coherence*) also tend to have relatively poorer sequential abilities. This is consistent with our preceding discussion of the coherence response types in relation to the normal reader and disabled reader group comparisons.

Summary and Conclusions

There are several interesting findings from the analyses using Stein and Glenn's story grammar scheme to examine sensitivity to story structure in recall. First, in overall amount of information recalled, there were no significant age differences within the reading disabled group. Similarly, there were no differences between the fifth grade normal readers and younger disabled readers. These two groups are approximately the same age, and the younger disabled readers constituted the entire V > P IQ discrepancy group. Therefore, it appears that at least one sort of disabled reader (V > P) is very much like its normal age-peer group insofar as story schematic knowledge is concerned. Within the reading-disabled group, however, there were differences associated with IQ discrepancy, and these differences are significant in three grammar categories *(major setting, direct consequence,* and *minor setting)* and in overall mean amount recalled. The differences generally favored the V > P group over the V = P group and always favored the V > P over the V < P group.

Second, story grammar category salience (i.e., rank ordering) is the same for all comparison groups regardless of age, reading ability, or verbal-performance IQ score discrepancy. But, this finding must be considered in light of the significant differences in recall between IQ discrepancy groups for the typically most well-remembered categories *(major setting and direct consequences).* Taken together, these results suggest that for some disabled readers (V < P) but not for others (V > P), differential sensitivity to elements of stories may not be sufficiently developed and, therefore, inadequate story schemata may indeed be one source of the overall poorer recall among the V < P disabled readers.

These results confirm Stein and Glenn's developmental findings that certain kinds of information are more important or memorable in a story and are more likely to be recalled. Because this holds for a student population as extreme as the one we observed, we strengthen the assumption that story schemata are used in encoding and recalling specific story information. Precisely to what extent difficulties at the schematic level contribute to overall difficulties of comprehension and recall cannot be determined from our data.

The profile of the disabled readers compared to fifth-grade normal readers changed somewhat when we applied a different type of scoring scheme to the story recall protocols. In this case we find that normal and disabled readers differ significantly in all response types except *added information*. However, the high degree of correspondence between the normal and disabled groups in rank order of response types suggests there may be quantitative but not striking qualitative differences between the groups.

There are other noteworthy differences and similarities between the normal and disabled reader groups. First, the disabled readers both add and omit more sentences in their retellings than the normal readers; thus, the normal readers' recall is more exact. This finding is corroborated by the fact that the normal readers produce twice as much information in verbatim form as do the disabled readers. Second, the disabled readers exclude temporal and causal markers to a greater extent than the normal readers; and normal readers, more than the disabled, make causal and temporal relations explicit in text by adding words that mark these relationships. Finally, although the disabled readers add more plausible sentences to stories than the normals, perhaps to compensate for faulty memory, they otherwise appear to have adequate comprehension of simple stories. This is supported in part by the relative absence of *wrong information* added to the story retellings of both the normal and disabled readers.

Analyses comparing response types for the IQ discrepancy groups revealed that all three were quite similar in rank order of response types. Furthermore, there were no differences among groups except in the amount of information recalled in verbatim form. And here, the V > P group produces significantly more than V = P and the V < P groups.

In conclusion, it is appropriate to ask what we have learned from our work. And perhaps the best way to address this is to pose and answer a set of questions related to those that originally guided our work.

1. *Do dyslexic children have problems understanding simple stories?* Generally, no, not insofar as comprehension is tapped by accuracy and plausibility of information supplied in *free recall*. However, probes may be better measures of comprehension than free recall. This suggestion has some support in a study by Omanson, Warren, and Trabasso (1978) who found that children could make complex inferences, in response to probes requesting inference-making, which they did not produce spontaneously in free recall tasks. Thus, a more stringent measure of comprehension might indeed reveal comprehension difficulties or differences.

2. *Do dyslexic children have problems recalling information in simple stories?* Yes. When we measure recall quantitatively, taken as a group, the disabled readers recall much less than do the normal readers.

3. *Have we supported the notion that there are differences among subgroups of disabled readers?* Yes, there are differences if we examine verbal-performance IQ discrepancy groups, using amount of accurate recall based on

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story grammar category grouping. Furthermore, disabled readers with relatively high verbal IQ's are as good, and in some cases better, than their normal age peers. Finally, these differences appear to be related to story schemata. Differences in the categories of *major setting, direct consequence,* and *minor setting*, suggest that V < P disabled readers have inadequate schemata for stories.

4. Finally, *which findings merit additional investigation?* There are several general ones.

a. The most striking findings generally support a deficit or maturational lag hypothesis. Subtle differences, however, in sensitivity to story structure, ability to recover in verbatim form the structure of information, and sensitivity to causal and temporal relations suggest that there are qualitative differences in cognitive and linguistic processing which may be important. These differences, and others as they are revealed, should be investigated to determine their theoretical and practical significance.

b. Within the reading disabled group, the V < P group, in addition to being poor readers, appears to be less competent at many language skills. The V > P group, in contrast, appears to be quite similar to their skilled age peers in comprehension, recall, and in development and use of story schemata, but different in that they are specifically less skilled in reading. This distinction of general language disability versus specific reading disability has powerful implications for diagnosis and remediation. It clearly merits careful additional investigation.

c. Finally, like others who study children with severe language or reading disabilities, we found large variation within groups as well as between groups. This suggests that standard inferential statistical procedures and experimental and empirical methodology may not be appropriate. Instead of gathering a small amount of information on a large number of individuals, it may be more fruitful to explore a large number of variables within a small sample of individuals who are highly similar. Such an approach is a cross between the case study method and the experimental method, and it may combine the advantages of each while avoiding the shortcomings of both.

References

Bannatyne, A. 1968. Diagnosing learning disabilities and writing remedial prescriptions. *J. of Learning Disab.* 1:28–35.

Bannatyne, A. 1974. Diagnosis: A note on recategorization of the WISC scaled scores. *J. of Learning Disab.* 7:13–14.

Brown, A. L. and Smiley, S. S. 1977. Rating the importance of structural units of prose passages: A problem of metacognitive development. *Child Develop.* 48:1–8.

Frederiksen, J. R. and Weaver, P. A. 1979. *A componential approach to locating and correcting reading disabilities of young adults.* Proposal submitted to the Department of the Navy, Office of Naval Research.

Kintsch, W. 1977. On comprehending stories. *In* M. Just and P. Carenter (eds.). *Cognitive Processes in Comprehension: Twelfth Annual Carnegie Symposium on Cognition.* Hillsdale, New Jersey: Erlbaum.

Lesgold, A. M. and Perfetti, C. A. 1978. Interactive processes in reading comprehension. *Discourse Processes* 1:323–336.

Mandler, J. M. and Johnson, N. S. 1977. Remembrance of things parsed: Story structure and recall. *Cognitive Psychology* 9:111–151.

Mattis, S., French, J. H., and Rapin, I. 1975. Dyslexia in children and young adults: Three independent neuropsychological syndromes. *Develop. Med. and Child Neur.* 17:150–163.

Omanson, R. C., Warren, W. H. and Trabasso, T. 1978. Goals, inferential comprehension, and recall of stories by children. *Discourse Processes*, 1(4):337–354.

Perfetti, C. A. and Goldman, S. R. 1976. Discourse memory and reading comprehension skill. *J. of Verbal Learning and Verbal Behavior* 14:33–42.

Roit, M. L. 1977. *A re-evaluation of a multiple syndrome theory of dyslexia.* Unpublished qualifying paper, Harvard University Graduate School of Education.

Rugel, R. P. 1974. WISC subtest scores of disabled readers: A review with respect to Bannatyne's recategorization. *J. of Learn. Disab.* 7:57–64.

Rumelhart, D. E. 1975. Notes on a schema for stories. *In* D. G. Bobrow and A. M. Collins (eds.). *Representation and Understanding: Studies in Cognitive Sciences.* New York: Academic Press.

Rumelhart, D. E. 1977. Toward an interactive model of reading. *In* S. Dornic (ed.). *Attention and Performance*, Vol. 6. Hillsdale, New Jersey: Erlbaum.

Smiley, S. S., Oakley, D. D., Worthen, D., Campione, J. C., and Brown, A. L. 1977. Recall of thematically relevant material by adolescent good and poor readers as a function of written versus oral presentation. *J. of Educ. Psychol.* 69:381–387.

Stein, N. L. and Glenn, C. G. 1975. A developmental study of children's recall of story material. Paper presented at the meeting of the Society for Research in Child Development, Denver, April 1975.

Stein, N. L. and Glenn, C. G. 1979. An analysis of story comprehension in elementary school children. *In* R. O. Freedle (ed.). *Discourse Processes: Advances in Research and Theory*, Vol. 2. Norwood, New Jersey: Ablex.

Thorndyke, P. W. 1977. Cognitive structures in comprehension and memory of narrative discourse. *Cognitive Psychology* 9:77–110.

Vellutino, F. R. 1977. Alternative conceptualizations of dyslexia: Evidence in support of a verbal-deficit hypothesis. *Harvard Educ. Rev.* 47:334–354.

Weaver, P. A. 1978. Comprehension, recall and dyslexia: A proposal for the application of schema theory. *Bull. of Orton Soc.* 28:92–113.

Communication Competence in Reading and Learning Disabilities

Tanis H. Bryan

University of Illinois
Chicago, Illinois

Introduction

> *Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing or motor handicaps, to mental retardation, emotional distrubance, or to environmental disadvantage (Federal Register 1976).*

The definition of learning disabilities is heavily weighted with disorders in various components of language. The processes involved in language and its impact upon learning to read and write are mainstays in this definition. Whether learning-disabled children do in fact have language disorders is a question for empirical investigation. The data related to language skills of children considered to have learning disabilities are reviewed in this paper. The title of the paper refers to *communication,* however, rather than to language, because of a belief that it indicates that a broader perspective of language is necessary. Thus the discussion is not restricted to syntactic, phonology and semantic studies of learning-disabled children; it includes nonverbal communication, pragmatic language, language in social contexts, verbal rehearsal, and language in problem solving.

In reviewing these data there are a number of problems. First, there are not many studies concerned with language development and deficits in

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learning-disabled children. Although the definition of learning disabilities, as cited above, focuses on language, there is not much of a data base available. Second, the existing research is fragmented. There have been no programmatic assessments of language and too little research to investigate phonology, syntax, semantics, and pragmatics—let alone the inclusion of nonverbal behaviors. There have been too few attempts to relate specific language deficits to learning to read or think.

The most critical issue is probably the relationship of learning disabilities to assessment of intelligence. To the extent that intelligence tests have been used to determine the existence of language disabilities, we suffer the risk of concluding that learning-disabled children are somewhat less intelligent than their counterparts who are nondisabled.

With these limitations in mind, I will review research on nonverbal communication, phonology, syntax, semantics, and pragmatics in relation to learning disabilities.

Nonverbal Communication

Decoding in Nonverbal Communication

Studies of the social skills, social status, and social interactions of learning-disabled children led to the hypothesis that many learning-disabled children do have language-based problems which affect their acquisition of social skills as well as academic skills. Given the attentional, perceptual and behavioral attributes associated with learning disabilities, a further hypothesis was that such children might be at a particular disadvantage in learning nonverbal cues (Bryan 1978).

In that 1978 study, auditory and visual nonverbal social stimuli were used to test learning-disabled children's decoding skills. For this purpose, a shortened version of a test, developed by Professor Robert Blumenthal and colleagues (1977) to study nonverbal communication, was used. The tests expose subjects to a film and an audiotape. The film has 40 segments which display an adult female expressing positive or negative affect combined with dominant or submissive expressions. Examples include expressions of motherly love, gratitude, nagging, and asking for forgiveness. The 40 audio scenarios present the same affects as the film, but the messages have been made uninterpretable by removal of the high frequency sounds or by scrambling and resplicing the tape. The viewer is asked to indicate on a questionnaire which one of two statements best describes the scenario. To control for reading problems, the questionnaire items were read aloud to subjects immediately after the scenario.

Subjects were third, fourth and fifth grade boys and girls who had been identified by the school district as having a learning disability. These were children with IQs above 80 on an individually administered intelligence test, but with discrepant academic achievement which warranted the daily, part-time services of a learning disabilities resource room teacher. Most of the studies were conducted in a racially integrated suburban school district and included about 40 percent black children. In each study, there were control children randomly selected from classmates who matched the learning-disabled children on sex and race.

The test of nonverbal communication was administered to each child on two occasions. In both administrations, the results indicated that the learning-disabled children were significantly less accurate in comprehending nonverbal communications than nondisabled children. Modality of presentation did not affect the outcomes. Learning-disabled children were less accurate than others on both audio and visual presentations.

Wiig and Harris (1974) conducted a study of learning-disabled adolescents' ability to identify six emotions: anger, fear, embarrassment, frustration, joy, and love. Compared to a nondisabled group, the 15 male and 2 female learning-disabled adolescents were less accurate in judging these emotions. Unlike the comparison group, they confused emotions which are usually easily distinguished. For instance, the learning-disabled subjects confused embarrassment with joy; the nondisabled never made this error. However, J. Bryan and Perlmutter (in preparation) point out that the subjects indicated their choice of emotions by circling the word which would best describe the depicted emotion as perceived. Hence, Wiig and Harris may have confounded their results with reading ability.

There is thus some evidence that on one component of language—decoding nonverbal communications—learning-disabled children perform with less accuracy than their nondisabled counterparts. This may be one specific component in the communication process which is contributing to some of the problems of learning-disabled children. The negative attitudes of others toward learning-disabled children may be a ripple effect of a process wherein learning-disabled children fail to detect and decode adequately nonverbal cues from others, so that they respond inappropriately and thus elicit rejection. Children unable to detect, understand, remember, and respond to the nonverbal cues of others are likely to be at a great disadvantage in social situations.

Encoding in Nonverbal Communication

Given some evidence that learning-disabled children are less accurate than nondisabled children in comprehending nonverbal cues, we must ask whether they are also less accurate in encoding nonverbal cues. Are these children less skilled at expressing themselves through auditory and visual channels of nonverbal communication? While modulating emotions, such as anger or joy, may be quite primitive and acquired at early ages, the acquisition of subtle nonverbal behaviors appears gradually and certain nonverbal behaviors are not commonly used by children until they reach about 10 to 12 years of age (Ziven 1977).

There is no direct empirical evidence that learning-disabled children differ from others in their ability to encode nonverbal communication. There is, however, indirect evidence suggestive that this may be the case. J. Bryan and Perlmutter (in preparation) had adults rate learning-disabled and nondisabled children by viewing videotapes of the children playing a game with another child in a laboratory setting. Bryan and Perlmutter found that the adults made very fine discriminations between learning-disabled and nondisabled children. The learning-disabled children were given lower ratings on clusters of items rating mental and physical presence and sociability. Learning-disabled children were also rated as less dominant than nondisabled children. It is striking that on ratings of mental and emotional status, the distinctions are more clear for girls. Learning-disabled females appeared to be judged the most deficit of any group.

The findings of this study indicate that strangers who had no prior knowledge of the children's academic status or any interaction with them could, on the basis of exposure to one-and a-half to four minutes of very poor videotapes, consistently and negatively judge learning-disabled children. We believe, but have not yet established, that a major contributor to adults' negative judgments of learning-disabled children is their nonverbal behavior.

Phonology

The information-processing hypothesis has been a major theoretical approach in studies of learning disabilities. But in the field of reading one school of thought holds that deficits in processing phonological information are a cause of reading problems. Mattingly (1972) defines reading as a language-based skill which requires the reader to know how shapes of letters and the combinations of letters relate to the sounds of language. Mattingly indicates that beginning readers and skilled readers encountering an unknown word form a phonetic representation of the written word. Vellutino (1977) suggests that good and poor readers may be discriminated by differences in their conscious awareness of the fact that individual sounds make up words and that poor readers are less aware of the phonetic structures of words.

Phonological Aspects of Reading Disability

Clinically, there has been recognition that phonological deficiencies are related to reading problems. For instance, Wepman's (1960) Auditory Discrimination Test, which requires children to indicate if two words sound the same or different, has been commonly used to test children's decoding of differences in sounds. There is evidence to suggest that children with reading problems are more likely than good readers to have speech articulation deficiencies (Naidoo 1972). Children with difficulty in articulating single sounds, or difficulty in hearing the differences in sounds, are believed to have greater difficulty than others in segmenting words into individual units of sound; hence they are retarded in making phoneme-grapheme associations.

The idea that poor readers' difficulties stem from deficiencies in segmenting words into single sounds is in direct contradiction to the idea that poor reading is the result of visual processing inefficiencies or of difficulties in comprehending chunks of text. Shankweiler and Liberman (1972) have conducted several research studies to sort out these opposing notions. For example, they have compared good and poor readers on oral reading of word lists versus repetitions of the same words; and they have studied good and poor readers' recognition of designs and faces in contrast to the recognition of nonsense syllables.

The results of the Shankweiler and Liberman studies indicate that reading problems are not simply the result of auditory discrimination problems or visual perceptual problems. When children's ability to repeat words was contrasted with their ability to read orally the same words, good and poor readers were better able to repeat words. Poor readers, however, made many more errors than good readers in oral reading of word lists and, as a result, the poor readers showed marked differences in their ability to repeat versus their ability to read orally. First, this suggests that oral reading errors are not the result of auditory discrimination problems. Second, an examination of the types of errors made on the oral reading suggests that the problem is more one that is phonological than visual. The largest proportions of children's errors were made on vowels (43 percent) and consonants (32 percent). Errors reflective of visual perceptual difficulties consisted of 10 percent on orientation errors and 15 percent sequence reversals. In addition, children made more errors on the middle and final parts of the words than on initial sounds. Further support for the phonological explanation of reading difficulties is derived from a comparison of good and poor readers' disciminations of faces, designs, and nonsense syllables visually presented. Poor readers are not discriminated from good readers in ability to recognize designs and faces, yet they have considerably more difficulty with nonsense syllables. Finally, a follow-up study indicated that kindergarteners who had difficulty segmenting words into single sounds were more likely than others to have difficulty in beginning reading (Liberman, Shankweiler, Liberman, Fowler, and Fischer 1976).

In sum, the data supports the hypothesis that deficiencies in acquiring knowledge of the phonological system can have deleterious effects on the acquisition of reading skills. Vellutino (1977) hypothesized that some children may be having problems in making auditory discriminations among sounds or may not be aware of the component parts—the segments—of words and, therefore, are unable to make the necessary associations between spoken and printed language.

Syntax

Syntactic Aspects of Reading Disability

A number of studies have examined the syntactic skills of learning-disabled children. These studies are theoretically consistent with the research on phonological deficits in poor readers because of the underlying assumption that the acquisition of reading skills is directly related to language skills. Fry, Johnson and Muehl (1970) compared good and poor oral readers' abilities to tell a story in response to 20 pictures. First, good and poor readers were discriminated on the size of speaking vocabulary; good readers were found to have larger speaking vocabularies and to be more fluent. Second, poor readers were distinguished by complexity of linguistic patterns; they used more subordination in the subject position while above-average readers used more subordination in the predicate position. Third, poor readers used more "existence" type sentences than above average readers. (An "existence" type sentence is one in which the sentence is introduced by the word "there" followed by a form of the verb "to be" as in "There's a dog"). In addition, good readers were more likely to create meaningful stories while poor readers enumerated the content of the pictures.

Vogel (1977) developed a test battery, used in conjuction with tape recording, to identify syntactic skills in dyslexic and nondyslexic seven and eight year old boys. Dyslexic boys were different from the nondyslexic in detecting whether a sentence heard was a statement of information or a question. They were less skilled in detecting differences in the rhythm of speech and its relation to the type of communication being expressed. The dyslexics were also less skilled in repeating sentences and in generating a word for one deleted from a spoken paragraph. In addition the dyslexic boys performed more poorly on a test of knowledge of morphological rules.

Wiig and Semel (1976) have studied syntactic skills in learning-disabled children who ranged in age from about seven years through adolescence. In one study, using the Northwestern Syntax Screening Test (Lee 1974), they compared the language comprehension of second through seventh graders. On the comprehension part of this test, the examiner makes a statement and the child has to indicate which of two pictures best fits the statement. On the expression part, the examiner points to a picture and the child has to state what it represents. Not only were the learning-disabled children inferior to nondisabled children but their performance placed more than half of the disabled below the tenth percentile in expressive language, a level suggested by Lee (1974) as indicative of need for extensive intervention.

Wiig and Semel (1975) provide evidence that syntactic deficits in learning-disabled children persist into adolescence. When required to form a sentence using a stimulus word, learning-disabled adolescents generated more non-grammatical and incomplete sentences than nondisabled peers. The non-grammatical sentences were produced when the stimulus words were "after" and "belongs." In addition the learning-disabled subjects sentences were marked by shorter mean word length and longer response times. Wiig and Semel describe the spoken language of learning-disabled children as having a lack of specificity (defined by the use of many articles, uncommon nouns and adjectives and prepositions) and failure to exhibit a richness of vocabulary (defined by the use of uncommon verbs, adjectives and nouns and the use of indefinites). In addition, their language was characterized as having an abundance of interjections, indefinite pronouns and conjunctions, absence of adjectives, and many filled pauses and word repetitions.

Using subjects defined as learning-disabled and reading-disabled, investigators have consistently found both classifications of children to be less skilled in decoding sentences, in generating syntactically correct responses to a variety of verbal and visual stimuli, in using complex types of grammatical forms in sentences, in creating correct and/or imaginative sentences and stories from visual stimuli. The data are sparse but their consistency in finding disabled subjects less adequate than nondisabled on so many variants of syntactic behaviors suggests this is a fruitful avenue to pursue.

Semantics

Semantic Aspects of Reading Disability

There is little empirical evidence concerning learning-disabled children's acquisition of semantic skills; often the studies cited are the same as those cited for syntax research. As with the latter, however, the results of the semantic studies, albeit sparse, support the notion that learning-disabled children are at a disadvantage in comparison to nondisabled children in the acquisition of semantic skills.

Fry, Johnson and Muehl (1970) interpreted the differences between good and poor readers on the oral story-telling exercise to be the result of linguistic deficiencies. This means that the child with limited word recognition and comprehension ultimately has limited numbers and types of verbal labels available for learning. The linguistic deficiencies in turn make it more difficult for the child to make associations between sounds and symbols and to obtain meaning from context.

Do learning-disabled children have difficulty in attaching verbal labels to stimuli? Denckla (1974) compared word naming in dyslexic, nondyslexic minimal brain damaged, and normal eight to ten year olds. Dyslexic children made more errors in naming pictured objects than normals and dyslexics were discriminated from nondyslexics in naming words which appear infrequently. In comparison of dyslexics and nondyslexic minimal brain dysfunction children, results showed that dyslexics were more likely to use circumlocutions (41 percent of total errors) and the MBD's to use wrong names (61 percent of total errors). Dyslexic subjects also had longer response latencies than the other groups.

Denckla and Rudel (1976a, 1976b) compared good and poor seven to twelve year old readers on rapid naming tasks. As in the other studies, the poor readers not only made more errors but they took longer than good readers to generate the names of common objects, numerals, colors, words and letters. Similarly Perfetti and Hogaboam (1975) found poor readers to have a longer response latency on rapid naming of words, pseudowords, and words with more than one meaning.

Differences in correct naming differences in speed of response between dyslexic and nondyslexic children appear to continue to differentiate between them into adolescence. Wiig and Semel (1975) had learning-disabled adolescents retrieve labels for pictures of objects, letters, geometric forms, actions, numbers and colors. The learning-disabled subjects committed more naming errors and took longer to respond. In addition, they found that learning-disabled adolescents were less able to provide definitions for words—*robin, apple, return, bridge, continue, history, material, decide,* and *opinion.* For example, while 22 of 32 learning-disabled subjects were unable to define the more abstract terms, such as *bridge, history, material, decide* and *opinion,* only 2 of the 32 nondisabled adolescents failed to make correct sentences with these items.

Automaticity and Verbal Mediation

Automaticity.

The consistent finding that learning-disabled and reading-disabled children have a longer response latency when required to make a verbal response raises the question of whether they are having difficulty in developing automaticity. "Automatic processes" refer to processes which we accomplish without awareness, intention or much effort (Posner and Snyder 1976). Processing efficiency refers to the speed with which verbal information is learned and the ease of subsequent recall. Longer response latency to recall verbal labels thus suggests that learning-disabled children are not as proficient at automatic processes. But a recent study, in which one component of automatic processing was measured, failed to find learning-disabled children to be less efficient than nondisabled children. Goldstein, Kosteski, Hasher, and Edelman (1978) presented groups of learning-disabled and nondisabled children with lists of words. Following exposure to these words, subjects were presented with lists which contained these words and others. They had to indicate which words they had seen on the earlier trials. The learning-disabled children were not distinguished from nondisabled children in estimating which words had been presented earlier although they tended to overestimate the number of times they had seen stimuli words. This study suggests that learning-disabled children were not less skilled in the automatic processing of information. However, there is a critical difference between the response demanded in the automaticity study and in the studies of verbal skills. In the automaticity study, subjects had to recognize words; in the verbal studies, subjects had to produce verbal responses, ones which were often quite specific. Less efficient automatic processing in learning-disabled children may then be specific to difficulty in retrieving stored verbal information and greater difficulty in manipulating symbols. A research area which has investigated the use of verbal symbols to solve problems is that of verbal mediation. The use of verbal labels and rehearsal during learning tasks may then provide some evidence as to whether learning disabilities are related to inefficient processing of verbal information.

Verbal Mediation

Mediation is a process that takes place after a person sees or hears something and before he makes a response. One important form of mediation is language, and the child's use of language in problem-solving activities in considered critical for the child's development (Bryan and Bryan 1978). The question is then raised as to whether the differences in verbal skills and the longer response latencies in learning-disabled children are related to their ability to use language in problem-solving tasks which are facilitated by mediation. Vellutino and his colleagues (1977) have been systematically studying the question of whether poor readers suffer from a deficit in visual perception, a popular interpretation of reading failure. They have consistently found that reading-disabled children are not different from good readers on tasks which require only visual perception but that performance deteriorates when verbal symbolization is required. This has led Vellutino to conclude:

> . . .poor readers lack the implicit linguistic cues (syntactic, semantic, and phonologic) that alert them to the critical differences in letters and words. Consequently, they take longer and have more difficulty in stabilizing positional and directional constancy in reading and spelling. Poor readers, therefore, are typically slow and plodding in processing written material; such perceptual inefficiency, however, would seem to be a consequence of dysfunction in visual-verbal learning rather than an indication of visual-perceptual deficit in the strict sense. (1977, p. 346).

There is some direct evidence that reading-disabled children are less efficient in problem solving because of verbal mediation deficits. Torgesen and Goldman (1977) administered two memory tasks to second grade children who were significantly different on reading scores. On the first memory task, children were shown seven line drawings of common objects. After an exposure of one picture per 2 seconds the child lowered translucent goggles over his eyes for a 15-second delay period. Then the child had to point to the pictures in the sequence the experimeter had pointed out to them. Children's performances were evaluated on the number of stimuli recalled in the correct sequence and on the evidence that the child verbalized; that is, rehearsed during the 15 second delay period. The child's use of rehearsal was judged by the experimenter on the basis of whether the child spoke the stimulus names or used lip movements that indicated to the experimenter that the child was rehearsing, or by random lip or facial expressions. In addition, children were asked if they had done anything to help remember the sequence. The results indicated that the higher scoring readers performed significantly better than the poorer readers on total recall of the sequence and on the amount of verbalization. They scored significantly better on total recall and on the amount of rehearsal. They were also much more likely to indicate an awareness of having used a rehearsal strategy.

Immediately following the first task the memory task was repeated. In this instance, however, the child was required to say aloud the picture names during the presentation and recall phases. It was hypothesized that this procedure might serve as an inducement to children to rehearse. The reading-disabled group improved significantly between the first and second tasks on verbalizations and total recall, but good readers did not demonstrate significant improvement across tasks. In addition, the scores on recall and verbalizations did not discriminate between good and poor readers on the second task. The results thus provide support for the notion that reading-disabled children do not spontaneously employ verbal rehearsal on problem solving tasks, and that external inducement to rehearse can reverse their failure to do so.

Language in Social Contexts

Given the importance of language in social discourse, it is surprising that there is little information available on how the various linguistic deficits found in learning-disabled children might affect their relationships with other people. Less accuracy in comprehending nonverbal communication, slowness in responding with verbal labels, using less specificity and less complexity in communications could all negatively affect learning-disabled children's ability to interact with others. Entwisle (1975) points out that children have not only to acquire basic language forms, but they have to learn how to use various language styles; that is, they have to know what to say to whom and when to say it. For instance, depending on one's audience, we modulate the pitch and loudness of voice, syntactic complexity and vocabulary, as well as content. When a child fails to modulate his verbal and nonverbal communications as expected, it is a reasonable prediction that parents and teachers, and possibly peers, will become irritated and rejecting of the child. The child with difficulty understanding others and expressing himself may have difficulties eliciting positive affect and positive responses from others.

In several studies, the author found that learning-disabled children received more sociometric votes of rejection and fewer sociometric votes of acceptance, and hypothesized that learning-disabled children experience social rejection because of inadequate communication skills (T. Bryan 1974, 1976). Laboratory and observational studies compared both the semantic content and the linguistic complexity of learning-disabled and nondisabled children's communications. The linguistic analysis was part of a laboratory study based on Shatz and Gelman's (1973) finding that four year old children communicated differentially to adults, peers, and two year old children. Four year old children use shorter utterances and more attention-getting statements when speaking to two year olds than when speaking to adults and peers. Bryan and Pflaum (1978) employed 40 fourth and fifth grade learning-disabled and nondisabled boys and girls in a laboratory setting in which each child taught a laboratory game to a classmate of the same age and to a kindergarten-aged child. The children's communications were videotaped and then analyzed for their lingusitic and social content. The linguistic analysis was based on the children's t-units. (A t-unit is defined as an independent clause with all the dependent clauses attached to it. A t-unit has a subject and one or more predicates. Within a t-unit there may be several linguistic structures which increase its complexity. These include dependent adjective and *because* clauses; adverbial, nominal and *if* clauses; and the use of modifiers. Not all utterances are t-units. There are incomplete phrases, mazes, and tangles—*so wait it till you see that*—and isolated words, often used in introductory phrases—*oops, yeah.*) Children's communications were classified according to: the total number of t-units, modifiers, non t-unit phrases and words, the mean length of t-units, and the proportions of t-units which were complexities.

The results of the t-unit analysis of children's communications in the laboratory game situation were main effects for three of the linguistic categories, those which tap linguistic complexity rather than verbal talkativeness. Learning-disabled children used shorter mean t-unit lengths, smaller proportions of their t-units were complexities, and they used fewer modifiers. However, group interactions indicated that only male learning-disabled children differed in lingusitic complexity. Learning-disabled

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females did not manifest the same pattern. These data indicate that in a social context, learning-disabled males use less complex linguistic structures.

The communications were analyzed for their content as well. The children's communications were categorized as Instructions (how to play the game); Positive Social (personal and task-related conversation, laughter and humor); Neutral Feedback (keeping score); Incompetence (failure to clarify, or to give misinformation, and inappropriate humor); Competitive/Negative ("I beat you"); and Negative ("That's terrible"). In general, subjects made adjustments in the content of their communications to younger and same-aged peers. Younger children received more feedback and repetitions but less competitive and incompetent communications than peers. There were significant differences between learning-disabled and comparison children on the categories of Instructions and Incompetence. Learning-disabled children provided about the same amount of instructions to both peers and younger children. But nondisabled children provided a much higher proportion of instruction to younger children than to peers. On the incompetent category, learning-disabled children engaged in a higher proportion of these communications than nondisabled children. But the groups most engaged in incompetent communications were white learning-disabled males (when interacting with peers) and white learning-disabled females (when interacting with younger children). Black learning-disabled children and white and black nondisabled children engaged in a much smaller proportion of incompetent communications.

The results of this study support the hypothesis that learning-disabled children's communication in a social context can be discriminated from that of nondisabled children. By examining differential communications to younger and same-aged children it was found that learning-disabled children use less complex language than nondisabled children and fail to use less complex lingusitic forms and differential content when communicating to younger children. The results appear to be particularly relevant for learning-disabled males and, in the category of Incompetence, for learning-disabled white males.

Differences in communication content were also found in two classroom observational studies (Bryan, Wheeler, Felcan and Henek 1976; Bryan 1974; Bryan and Bryan 1978). In these studies, children's conversations in the classroom were recorded verbatim. One experimenter recorded everything a subject said, and a second experimenter recorded everything someone else said to the subject. In the 1976 study, two types of communication categories, Competition and Consideration, were found to discriminate learning-disabled and nondisabled children. Learning-disabled children emitted more competitive statements than nondisabled children. Competitive statements were those which indicated the child was comparing his performance with that of another child. Nondisabled children emitted more Consideration statements than disabled children. Consideration statements were "nice guyisms" such as letting a peer go first, reminding the other child of his/her turn (in physical education class), and giving positive reinforcements to others. The Consideration category was considered quite important because it is comprised of statements made with no direct or obvious antecedent; there are gratuitous forms of niceness generated spontaneously with no readily detectable overt cue. It is believed that this type of communication is used to establish a link with another person, to communicate positive feelings toward and elicit positive feelings from that person. In children's relationships this type of communication might be quite important in establishing and maintaining friendships. Failure to emit such statements, in conjunction with the emission of more competitive communications, may be responsible for the sociometric rejection of learning-disabled children.

In the second observational study of children's communications the communication categories consisted of Rejection (competitive, very nasty, mildly nasty statements and Rejection Total); Requests for Information and Materials; Helping/Cooperation/Giving Materials; Positive Reinforcement/Social Consideration; and Egocentric statements. The comparison of communications of 25 learning-disabled males and females and 25 nondisabled males and females showed learning-disabled children more likely to emit very nasty statements to peers and to be the recipients of more very nasty statements than peers. Learning-disabled children tended to be more likely to fail to respond to others than nondisabled children and to engage in more Rejection Total statements than peers. The sex of subjects played a role in the communications received from peers. Learning-disabled males were the most likely to have peers fail to respond to them while learning-disabled females were the least likely to not be responded to. But learning-disabled females were the recipients of the greatest number of mildly nasty statements from peers, followed by nondisabled males, learning-disabled males and nondisabled females.

As in the linguistic analysis of social communications, there are differential effects for learning-disabled males and females. While the interaction effects of learning disabilities and sex are complex, it is clear that learning-disabled children speak in less complex ways linguistically

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and less desirable ways communicatively. The learning-disabled speak in a nastier manner and are more likely to ignore the interpersonal initiations from peers.

In light of the linguistic and content differences in learning-disabled and nondisabled children's communications in social contexts, it is suggested that learning what to say—when, to whom, and how—may represent significant deficit areas for many learning-disabled children. The results of these studies indicate that learning-disabled children are experiencing very real difficulties in establishing satisfactory social relationships with others and that these problems are related to language skills. The sources of difficulty for learning-disabled children have been related to difficulties in comprehending nonverbal communication, and the form and substance of their expressive language—what they say and how they say it.

Conclusion

The evidence indicates that learning-disabled children show pervasive and enduring language problems across a wide variety of language tasks. The studies suggest that the problems experienced by learning and reading-disabled children may fall into the categories of phonology, syntax, semantics, and pragmatics as well as nonverbal communication. In terms of nonverbal communication, these children are less accurate in interpreting nonverbal auditory and visual cues. In phonology, it appears that they are less skilled in detecting the segments of single words and thus have difficulty establishing phoneme to grapheme correspondence. In the area of syntax, learning-disabled males are less skilled in dealing with inflection and the comprehension and creation of complex sentences. In semantics, they are less adequate than nondisabled children in defining words, creating sentences, and classifying objects into categories. They show less adequate sentence production, are less skilled at recognizing their errors, and are significantly slower in generating verbal responses. Finally, there is one study that suggests that learning-disabled children may be discriminated by their use of language in social situations.

References

Bryan, J. and Perlmutter, B. (In preparation). Adult judgments of learning disabled children.

Bryan, J. and Perlmutter, B. (In preparation). Children's judgments of learning disabled children.

Bryan, T. 1974. Peer popularity of learning disabled children. *J. of Learn. Disab.* 261-268.

Bryan, T. 1976. Peer popularity of learning disabled children: A replication. *J. of Learn. Disab.* 9:307–311.

Bryan, T. 1978. Verbal interactions and social relationships of learning disabled children. *J. of Learning. Disab.*

Bryan, T.H. and Bryan, J.H. 1978. *Understanding Learning Disabilities*, 2nd ed. Sherman Oaks, Calif.: Alfred Publishing Company.

Bryan, T. and Pflaum, S.W. 1978. Social, linguistic and cognitive analyses of children's dyadic interactions. Paper presented at the International Conference of the Association for Children with Learning Disabilities, Kansas City, Missouri.

Bryan, T., Wheeler, R., Felcan, J., and Henek, T. 1976. Come on dummy: An observational study of children's communications. *J. of Learn. Disab.* 9:661–669.

Denckla, M. B. 1974. Naming of pictured objects by dyslexic and non-dyslexic "MBD" children. Paper presented at the Academy of Aphasia.

Denckla, M.B. and Rudel, R. 1976a. Naming of object drawings by dyslexic and other learning disabled children. *Brain and Language* 3:1–16.

Denckla, M.B. and Rudel, R. 1976b. Rapid "automatized" naming (R.A.N.): Dyslexia differentiated from other learning disabilities. *Neuropsychologia* 14:471–479.

Entwisle, D.R. 1975. Socialization of language behavior and educability. *In* M. Maehr and W. Stallings (eds.). *Culture, Child and School.* Monterey, California: Brooks/Cole Publishing Co.

Fry, M.A., Johnson, C.S., and Muehl, S. 1970. Oral language production in relation to reading achievement among select second graders. *In* D. J. Bakker and P. Satz (eds.). *Specific Reading Disability.* Netherlands: Rotterdam University Press.

Goldstein, D., Kosteski, D., Hasher, L., and Edelman, K.M. 1978. Automatic memory processing in learning-disabled children. Paper presented at the International Conference of the Association for Children with Learning Disabilities, Kansas City, Missouri.

Lee, L. 1974. *Developmental Sentence Analysis.* Evanston, Illinois: Northwestern University Press.

Liberman, I.Y., Shankweiler, D., Liberman, A.M., Fowler, C., and Fischer, F.W. 1976. Phonetic segmentation and recoding in the beginning reader. *In* A. S. Reber and D. Scarborough (eds.). *Reading: Theory and Practice.* Hillsdale, New Jersey: Erlbaum.

Mattingly, I.G. 1972. Reading, the lingustic process, and linguistic awareness. *In* J.F. Kavanagh and I.G. Mattingly (eds.). *Language by Ear and by Eye: The Relationships Between Speech and Reading.* Cambridge, Massachusetts: M.I.T. Press.

Naidoo, S. 1972. *Specific Dyslexia.* New York: Wiley and Sons.

Perfetti, C.A. and Hogaboam, T. 1975. The relationship between single word decoding and reading comprehension skill. *J. of Educ. Prychol.* 67:461–469.

Posner, M.I. and Snyder, C.R.R 1975. Attention and cognitive control. *In* R.L. Solso (ed.). *Information Processing and Cognition: The Loyola Symposium.* Hillsdale, New Jersey: Erlbaum.

Rosenthal, R., Hall, J.A., DiMatteo, M.R., Archer, D., and Rogers, P.L. 1977. Measuring sensitivity to nonverbal communication. Unpublished monograph. Harvard, University.

Shankweiler, D. and Liberman, A.M. 1972. Misreading: A search for causes. *In* J.F. Kavanagh and I.G. Mattingly (eds.). *Language by Ear and by Eye: The Relationships Between Speech and Reading.* Cambridge, Massachusetts: M.I.T. Press.

Shatz, M. and Gelman, R. 1973. The development of communication skills: Modifications in the speech of young children as a function of the listener. *Monographs of the Soc. for Research in Child Dev.* 38(5):1–36

Torgesen, J. and Goldman, T. 1977. Verbal rehearsal and short-term memory in reading-disabled children. *Child Development* 48:56–60.

Vellutino, F.R. 1977. Alternative conceptualizations of dyslexia: Evidence in support of a verbal-deficit hypothesis. *Harvard Educ. Rev.* 47:334–354.

Vogel, S.A. 1977. Morphological ability in normal and dyslexic children. *J. of Learn. Disab.* 10:35–43.

Wepman, J. 1960. *Auditory Discrimination Test.* Chicago: Language Research Associates.

Wiig, E.H. and Harris, S.P. 1974. Perception and interpretation of nonverbally expressed emotions by adolescents with learning disabilities. *Perceptual and Motor Skills* 38:239–245.

Wiig, E.H. and Semel, E.M. 1975. Productive language abilities in learning disabled adolescents. *J. of Learn. Disab.* 8:578–586.

Wiig, E.H. and Semel, E.M. 1976. *Language Disabilities in Children and Adolescents.* Columbus, Ohio: Charles E. Merrill Publishing Company.

Ziven, G. 1977. On becoming subtle: Age and social rank changes in the use of facial gesture. *Child Development* 48:1314–1321.

EDUCATIONAL APPROACHES IN DYSLEXIA

Beyond the Alphabet: From Competent Reader to Avid Reader

Margaret B. Rawson

This paper is addressed to those who know, as I do, how vitally important it is for people to become competent readers. We are the convinced. We need not reiterate that it may even be literally a matter of life and death, of school and economic survival, of any sort of employment or vocational success, of staying out of jail or hospital, of driving a car, of protecting oneself against exploitation, of reading a menu or a mail order catalog, or of just having something to do while awaiting one's turn at the dentist's.

But survival is only the first step. If that is all we are working for in life, perhaps it is not worth all the effort that we and our students put into the struggle against tremendous odds. Some people have thought so. However, we do know two things that can make all the difference. First, we now know enough to be able to teach everybody to read at the functional or survival level and beyond. Second, we know that learning how to read is just the beginning of what can be a fascinating "good trip" in life—a trip that, if you have the competence, you will be free to take if you want to. Will you want to? To make reading barely possible is *one* of the basic jobs of education. To provide the opportunities that will help the young person find out what life is like, what is in it for *him* or *her*, is the other aim of education. It is both concurrent and all-embracing. This major job begins with the child's beginnings, takes the rest of his life, and can provide some of his richest experiences.

Education is for understanding, in the largest sense; training is for mastery. Education and mastery work best as partners. For example, take the Orton approach to the education of *dys*lexic children and young people, those with excessive difficulty in mastering language. Here the careful training aspects may take more attention than is needed by the "*eu*lexics," those who are naturally gifted in the learning of verbal skills. But the very process is designed to be cognitively oriented and full of its own satisfactions to the growing self. We need to obey Anna Gillingham's

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admonition, "Teach to the intellect," for it is, happily, stronger than the rote memory, and so we lean on it, finding real virtue in necessity.

Let us go on from "Supposing that I *can* read," to "Why should I *want* to?" There are several reasons. If the first response is, "Your sense of duty as a school child," that will not get anyone very far. Says Emerson, "When Duty whispers low, 'Thou must, the youth replies 'I can!' " But perhaps he says instead, "Oh, damn" or even, "Why should I?"

Another reason to read might be utility—a means to an end. That is a bit more compelling than duty, though perhaps not enthralling. There are many kinds of utility, some of them genuinely ego-supportive and not bad fun. But there must be more to it than this.

Annis Duff, one of the best writers on children's books, takes from Emily Dickinson the phrase, "The Bequest of wings," and uses it as the title of a book which, metaphorically, says it all.

Bequest of Wings

He ate and drank the precious words,
His spirit grew robust;
He knew no more that he was poor,
Nor that his frame was dust.
He danced along the dingy days,
And this bequest of wings
Was but a book. What liberty
A loosened spirit brings.

From *First Series. Life, XXI, A Book.*

Another title, this time of a program, *Reading is FUNdamental*, marries the two, utility and delight, and helps to get the young person *"Hooked on Books,"* another seminal title and an aim of the first importance.

We can surely agree that we need to be scientific as well as humane. In our context, what does that mean? To describe, explain, and perhaps to predict; to know what works and why. A book edited by Arnold and Virginia Binder and Bernard Rimland, *Modern Therapies*, considers these aspects of therapy and goes on to discuss ways of measuring success. These depend, they say, upon one's goals.

One can judge by rating somewhat *subjectively*, based on a single instance ("How did he come out?") or comparatively ("Did he catch up with the others? Do better? Lag behind?"). One can use *rating scales*, still with a considerable complement of subjectivity and sampling limitations (grades, class standing, and the like). One can use the standardized *tests*, psychological or educational, normative, or criterion-referenced. If appropriate, one may use the more exact *measurements* of physical growth, strength, or certain kinds of behavioral functioning. As criteria of success, one can use relation to norms, or one can look at *intra-individual change* and growth toward the more general goals of competence and enthusiasm for living and for *continued* growth.

To these authors, it seems unlikely that a given therapy will produce beneficent change simultaneously in all of the three dimensions of *cognition, emotion,* and *behavior*; but in the Orton-Gillingham framework I have seen this happen so consistently that I think of it as the probable outcome. If it does *not* all happen, we want to know why and to do something about it ourselves or call for appropriate additional help. We may not always be able to see the process through to the end in our own time with the student, but if we have not attended to all the dimensions as far as we have gone, we have not done our job. If, however, we have kept all three balls in the air as long as we have been at work, life can and often does take it from there, as we find when we encounter our ex-student years later.

Now to focus again on our title, going "beyond the alphabet" is something for which we are glad to be noted—even notorious. One needs, in fact, to go beyond it in both directions, to pre-reading and post "training," if along with intellectual challenge, the spirit is to be fed and the thirst for life, as found in and through books, is to be developed to the full. Logically, love of spoken language, with its fruits, comes first and provides the matrix for the love of books. Experience with print, in turn, enriches spoken language and thought and extends and enlarges vocabulary and the capacity for living, both vicariously and directly. As Dr. Ralph Sockman has put it, "The larger the island of knowledge, the longer the shoreline of wonder," and we might add, the more will be the "peak[s] in Darien" and the harbors in which to come snugly to anchor. And so any competent reader profits from becoming an avid reader.

Of course what is good education (in the comprehensive sense) for the eulexic is good for dyslexics and vice versa. Everybody, whatever his language-learning aptitudes, rates "the bequest of wings." By the time the dyslexic-type starter gets really underway, the same principles apply to both, though the details and the pace vary with the needs and tastes of the individual. While the child who has learned to read easily may come readily and eagerly to the literary hearthside, the child burnt by failure and a sense of ineptitude may need more inducement and helpful companionship as he learns to enjoy his birthright. He is the one we, as therapists, must find some special ways to approach. That is part of the art and science of the whole of education.

We should repeat, for we must keep it well in mind, that as much training as is needed in the skills of competence is a necessary component of education, just as are understanding and enjoyment, with the functional integration of the two approaches as our aim. Therapy of both kinds begins on day one of our contact with the delayed reader, with diagnosis and explanation, and goes on through the achievement of functional literacy to competence, self-confidence and independent, purposeful school and lifetime learning and enjoyment. There is a scenario, with variations, and there are ways to set the stage and keep the play moving. You know most of the standard ones, and have developed many of your own or, as I have, can do so—devices for enriching vocabulary and engendering enthusiasm, selections of sequences of books that lead to that benign addiction to print, and so on. Most of all, we want to keep the pace right, "as fast as possible but as slow as necessary," as Anna Gillingham said. And we want to see that our students have fun—not as a distraction, but as an integral part of the growing process. Little children seem to have a "set" for going at it this way, and we want to keep that attitude alive in the younger ones who come to us at the prevention stage and to restore the older ones to it according to each one's need.

In its particulars, the "scenario" is not detailed, but it is broadly outlined before the language learner ever gets to the beginning of reading-as-decoding. The love of books is best caught, rather than taught. It is best if the first exposure comes early, in the nursery, from a person who is a "carrier," who genuinely enjoys children, is enthusiastic about his or her own adult reading, and either already has a taste for children's books or is open to the development of such a taste.

The advice to read to children books that *you* like, *too*, needs emphasis on the modifier, *too*, to keep things in perspective. Sometimes the absurdity of omitting that little word is obvious, as when the science historian, George Sarton, gave to his little daughter, May, an elegant two-volume English-French, French-English dictionary, which served *him* long and well, but her only many, many years later. (Who is it who plays with Junior's elaborate electric train set?) On the other hand, there was five-year-old Holly who named her kitten "Hamlet" because, said she, "he wears a customary suit of solemn black!" Her actress mother explained, "When I read to her, I read things I like to read," and she read so well that Holly really did like it, too—and for always, and with deepening understanding as she grew up.

For most of us, the options are less spectacular—say to present Marjorie Flack's *Story About Ping* rather than to get entrapped by *Ducky Daddles and Jimmy Joe at Breadcrumb Pond*. You'll have to read whichever one it is three score times and ten. For both adult and child it might better be Wanda Gag's *Gone is Gone*. Need I say more? And if engines are to be personified, why not share the delight of Hildegard Hoyt Swift's *Little Blacknose?* Forget, if you are allowed to, the banal moralizing of *The Little Engine That Could* and banish the *de*moralizing falsity of *Tootle*. (If you have escaped that one and wonder at my vehemence, consult David Riesman in *The Lonely Crowd*.) I have just had the fun of introducing a whole new family, parents and children, to Blacknose, and they love him as much as my children did 40 years ago, and as their children did later. If this engaging little pioneer has nourished one's mind, spirit, and literary taste by the auditory route, he may be just the one to guide the eyes into reading a first "real, long book," already familiar, when skill has come to that point.

Now, whether the future bookworm is a "natural" reader, a preventively nurtured dyslexic, or an older child being rescued from failure, frustration, and refusal to have anything to do with print, let us assume that he is now getting the graphic form of language straight, "as it is." He has the alphabet and its clusters of letter-sound relationships "down cold" and, from $a + t = /a/ + /t/ = at$, he has been learning about blending sounds and syllables and longer and longer words. Simultaneously, he has been combining words into sentences and sentences into paragraphs, phrased and read like talking. At first he has met the *Fat Sam* type of sound-controlled vocabulary booklets. He knows these are only a kind of "finger-exercise" reading—but what is wrong with playing *Three Blind Mice*, or practicing throwing spitballs, until you get the hang of things? That is how skills are built, to begin with.

Is this child really a bookworm-to-be? Very often we can make a good clinical guess, but I think it works best if we first assume that he is going to *want* to be a reader. We can then leave the rest to him, with whatever good press we can give to the activity. I remember Tommy. He looked like a future literature addict to me, so I predicted to his mother that she would someday be saying, "Tommy, get your nose out of that book and go play ball!" "That," said she, "will be the day!" Sure enough, a year or so after our lessons had ended, she called me, chuckling, "Remember what you prophesied? Well, it's just happened and I thought you ought to know."

Someone, regrettably a noted reading teacher (from the *Dick and Jane* school) said, "I believe in nurturing individual differences—everyone has the right *not* to read." "A half-truth," said I. "How can you *choose* not to read unless you are *able* to read?" That stopped her, at least for then, I am happy to report. Of course, for some people like Pooh-Bear, exercise means "falling off the ottoman [without] the energy to clamber back." For some, the access to literature comes via the Saturday morning television, or even *Masterpiece Theater* of the Public Broadcasting Corporation, to which all honor.

There is the true story of Mason, a clinic patient, 14 years old and a complete nonreader, despite the IQ of 110 brought out by the WISC I was giving him. You may remember the question on the Information subtest, "Who wrote *Romeo and Juliet?*" Said Mason, thinking hard, "I ought to know that. . ." [How? I wondered.] ". . .I think he lived in olden times. . .and his name had 'spear' in it. . .Allspear?. . .Something like that!" "How did you know?" [As tester, I dared not also teach.] "Oh!" said he, "I saw that play on TV. It was really good!" And he told me about it—well enough to pass a high school test. Was he exercising his "right not to read" Shakespeare but to watch the tube that night? *I* might have been, but *he* had no choice. He could have learned to read and wanted to; but at that time there was no program open to him and so, though he is a successful, skilled workman—a mason—he is still cut off from the world of books.

Supposing the person can read, will he want to? He cannot choose intelligently and freely until he has experienced what may be in it for him—and that part of his teaching, too, had better be extra wise and positive so that it can supplant the negative conditioning of his earlier failure. His hope and his enthusiasm, once aroused, can hardly afford more than a very occasional "dud" or boring book experience. Many things will need to happen concurrently as he moves "beyond the alphabet"—or elementary skill learning—to being enthusiastically "hooked on books" and launched on a lifetime of use of printed riches for his own purpose.

He may need continued help in skill development. *Eulexics* seem to gain without much help the needed facility in word decipherment and recognition, a growing vocabulary of understanding, familiarity with complex sentence structure, flexibility of attack suitable to varied texts, and increased speed and power. *Dyslexics,* however, may need *continued help* for a long time with one technique or more, or periodic "booster shots" at crisis points in their schooling. Generally, I have found the best promoters of good comprehension, which so many people worry about, to be the degree of interest, felt need, and the quality of educational experience. Given these, only basic general intelligence seems to be the limiting factor.

Sometimes, however, some students need specific supplementary help with specific skills of understanding. Perhaps problems in mathematics need to be made real, with words translated into facts in sequence; history can be brought to life; science or art forms can be experienced; metaphor as a literary device can be brought to conscious awareness—all beyond what teachers need to do for others in the class who seem to get there mostly by themselves. These are what Weaver, in the pages of this journal last year, referred to as schemata for increasing comprehension. If they are needed, of course they should be brought into play.

Certainly, it is vitally important to make sure that the student meets the books that are right for him at the right time, as Vail made so clear, also in this journal last year. Nothing in this essay is as deserving of bold-face capital letters as this! I have always been glad that I started my teaching career as a limited-budget librarian for the school. With only 50 or 75 dollars a year to spend, I had to borrow and read a couple of thousand children's books so that I could know which few we could afford to buy when they came on the second-hand market. What is more, I knew that we, as churchmousely administrators, could afford very little junk. Neither, was I to learn, could the slow-starting reader afford to spend his limited time on inferior volumes when—and this is important—he could get all the profit and more of lasting satisfaction from the high quality ones. There are those who say, "Let him read all kinds so he will have a basis for discrimination." That is one route, especially if he is a facile reader with a large library available. I'd not stop him, but I believe one can find virtue in necessity, as we had to—a place for critical adult review before offering selection, but not done in a spirit of censorship. Ed's experience is an illustrative example.

Ed's first 12 years, at home and at school, presented him with a nourishing literary diet, controlled by budgetary necessity and parental choice in use of available resources. His junior high school library had no such restrictions. The very first day in 7th grade, its bursting shelves nearly overwhelmed him with joyous excitement. He discovered the Ralph Henry Barbour series-type school stories in which I too, his mother, had reveled at his age. He polished off one the first night. With the second one-night stand, came the heady announcement, "Boy! There are 27 of them and I'm going to read them all!" Two weeks later I asked, "Isn't that third Barbour book due today?" I was mean enough to add, "And what about the other 24?" "Aw," said he, "I've had enough. You read one, you've read them all!" So, in developing literary taste, as in skinning the cat, there are more ways than one. As an adult, Ed is no pedantic snob, but he *is* a discriminating reader.

When I became a reading teacher—a language therapist, in fact—it stood me in good stead to have used juvenile literature instead of adult who-dunnits for some years of leisure reading. It helps enormously to be able to say, "Here are two or three stories that kept me awake half the night when I read them. They are about [this and this and this] which are up your alley. You might like to consider one of them next. Take your pick." If your youngster has found your previous suggestions rewarding, and you have to see to it that he generally does, he'll feel helped, not manipulated, by this reasonable narrowing of the field. If you have guessed wrong, of course, you have to be genuinely ready to alter course. Some people thrive on *The Wind in the Willows,* but it is not everybody's dish and may, anyway, be better listened to than read to oneself. But *The Phantom Toll Booth* is an almost sure-fire success with its delicious mixture of fantasy and modernity. It is fun with words at Dictionopolis and with the Mathemagician, and all the other ways that Norton Jester, with help from illustrator Jules Pfeiffer, has found to play with character and philosophy and the high adventure of outdoing evil and rescuing princesses. There is something exciting and amusing happening on every page. But you do not *start* here.

In pursuit of the goal of fluent—not merely functional—literacy for the dyslexic and enthusiasm for the hitherto reluctant reader, I generally though not invariably follow some such line as this:

1. First comes the *therapy of diagnosis*—taking the language differences seriously, trying to understand *your* pattern and the difference it makes for *you,* and explaining both it and the treatment rationale.
2. Then I make the *promise,* as a probability prediction, that if we tackle the job "this way" and take advantage of the *scientific* approach to language, describing the Orton-Gillingham techniques, it won't be too terribly long before you will be reading real books about things you are interested in. No more of that baby-reader stuff for you! It will go slowly at first, and I'll give you a lot of help with figuring things out for yourself. Then, as your power grows with skill and practice, you'll do more and more for yourself and do it more easily and faster.
3. Then comes the "alphabet chapter"—technique, well and thoroughly done. It works; ask those who have used it.
4. As soon as possible, I like to substitute a tried and true sequence of *good,* so-called "trade books" for the standard or even the special reading texts. Adult reading aloud is mixed more and more

with the student's oral reading in the books we are enjoying together, leading eventually to independent silent reading and an expansion of power and a sense of growth. The student is not asked to read any words for which he does not have the skills to figure out on his own. There may be only a few he can do as he begins *Liang and Lo* or *The Outside Cat,* but there will be more by the end of each volume. It is a great morale booster when he realizes what is happening, as you see that he does periodically.

There will be as many of these brief, wide age and interest range books as he needs and wants, followed by those at the level of *Billy and Blaze, High Water in Arkansas, Little Blacknose, Max* (a realistic story of a bear cub and a boy), *Greased Lightning, Honk the Moose, Homer Price, The Enormous Egg, Mr. Popper's Penguins, Farmer Boy, Nuvat the Brave, Call it Courage, Justin Morgan Had a Horse,* and so on through more and more challenging but always interesting pieces of the world of reality, adventure, fantasy, humor, beauty and other joys. There are dozens of winners at every level until at last you are "on your own," with only as much help in selection as you want.

5. *Concurrent and advanced skill techniques* and encoding (spelling and writing) are parallel and cross-connected. Still, however difficult and time-consuming are the writing skills, one should not get so carried away by their obvious importance that reading and its joys are supplanted or neglected.

Then there is the whole question of what is sometimes called *bibliotherapy*. From my viewpoint, just becoming a competent reader is perhaps the most important bibliotherapy there is for a dyslexic, potential or confirmed. As the term is usually used, however, it refers to the deliberate choice of books with certain content for the student to read because of the contribution they are likely to make to his mental health, to the solution of his emotional or social problems.

A great many of the best books give us a golden opportunity to do this and I am all for using them. However, we are no longer in the era of "Goody Two-Shoes," the laughing stock of even my youth. If bibliotherapy is to work, it must be subtle. Pointing out the moral, or even drawing it out of the reader, will not only not adorn the tale, it will probably kill it—and your relationship with the student, too. It is, if anything, worse than studying Shakespeare by dissection or insisting on the mastery and acceptance of Mao's Little Red Book. The discussion of feeling, ethics, and social relations is certainly not taboo and merits frank, sensitive, and respectful handling. But that is a different matter. One has other reasons for offering or choosing a story, and the psychosocial therapy, while it is often intended by the adult, must seem "serendipitous" to the youngster or, very often, enter his world without benfit of conscious identification or acceptance. To achieve this is not so much manipulation as the high art of ministry and a mark of able therapy.

Some of the themes are universal, whether they are personal like fear or broadly philosophical like the age-old struggle between good and evil. There is the need to belong, to be accepted. Who of us has read *The Outside Cat* without identifying with Samuel who desperately wanted to be an inside cat? Samuel labors persistently in his own way to bring this about and, still true to his feline nature and dignity, finds his way to happy acceptance. Certainly, no dyslexic, unwillingly excluded from the most important life of his world, its language, and longing to be a full participant, can fail to identify with Samuel. Kate, in *The Good Master,* and many another in both real and imaginary time and circumstances—notably Madeline L'Engle's older young people—touch this theme, and through it the inner life of their readers.

Or is it the sense of identity, the "who am I and why am I here," that concerns us? Little Blacknose, sometimes puzzled and often triumphant, finds out as he lives through a hundred years or so into the history of science and technology. So do David, in *It's Like This, Cat,* and pre-teen Margaret in *Are You There, God? It's Me, Margaret,* to contrast divergent settings. It is a universal theme we find everywhere, often in the current rash of problem-oriented novels too explicit and obvious for the literary taste but apparently acceptably helpful to young readers.

Are you beset by fears, amorphous and terrible or specific but perhaps unmentionable? You, too, will welcome with Wagtail Bess, the therapeutic ministrations of Angus, the irrepressible, sympathetic Scottie dog as he helps her to get over being afraid and to "wag [her] tail and *smile* as an Airedale should." When the tiger who terrifies Liang, Lo and their erstwhile intrepid water buffalo turns out to be a paper structure (*you* knew he would, from the pictures), you are suffused with a warm glow of amusement, laced with unadmitted relief at the jolly homecoming paraders' acceptance of the destruction of their festival paper beast and their friendly invitation to "come back next year. . .creep into the tailpiece and make it wiggle." From here, all the way through the terrors of the road to the rescue of the Princesses of Sweet Rhyme and Reason, relieved with humor in *The Phantom Toll Booth,* and almost unbearable in the climaxes of *A Wrinkle in time, Narnia, The Lord of the Rings* and Alexander's *Taran* books, you learn, if you are ready, to face terror and live in triumph. But here is an area in which great wisdom is called for in the mentor. Some hardy youngsters seem to thrive on such challenges, but it is possible to push matters too far and too fast for a vulnerable child's tolerance. *The Hobbit,* just right for some people at some times, can bring on nightmares, as can so innocent seeming a tale as *Karoo, the Kangaroo,* when wild dogs almost overtake the mother kangaroo, terrifying a too frightened five-year-old imaginative identifier. It is well to read for oneself and re-read with *this* child in mind when one is walking the thin ice of therapeutic prescription.

Or are you a little girl, by turns glorying in and cramped by the chromosomal chance that made you female? *Joan Wanted a Kitty* (beautiful but in first reader vocabulary) or *Caddie Woodlawn* or *Roller Skates* may be your meat—being a girl can be great fun. Or *The Golden Horseshoe* and *Master Skylark,* and later, *As You Like It,* can give you the thrill of delightful, and eventually triumphant masquerade.

Small may not always be beautiful to you, but you can have recourse to Tom Thumb and his tribe, and all those put-upon third sons and daughters who star in the old tales, to *Paddle-to-the-Sea* and other artifacts, toys and animals come-alive; to *Stuart Little;* and to that heroic humorist, 6-inch Peter Peabody Pepperell III and his "airplane," Gus the Gull, in their exciting *Fabulous Flight* and its hilarious preliminaries.

Dyslexic children don't, praise be, think of themselves as "handicapped," but it helps to know such people as the characters in *Little Magic Painter,* David in *Two Children of Tyre,* Mary in the *Little House* series (before the media got hold of the *real* Ingalls). Time was, perhaps still is, when there was a lot of tear-jerking about people's physical and social-economic misfortunes, but it is not hard nowadays to find whole boys, girls, and adults living lives with aspects of wholeness and often super-humanity where once there were but sentimental Lame Prince-Little Matchgirl stereotypes. But don't take them from memory—read them afresh before you introduce them. They may be worse than "dated!"

One characteristic frequently met among dyslexic readers merits a special look because it may have to do with the special capacity many of them have to think, perceive and solve problems globally, as whole chunks of reality, rather than analytically and verbally. They have a thirst for realism. Perhaps, as the reading of Samuel C. Florman's *The Existential Pleasures of Engineering* suggested to me, it is because some books give our "right-hemisphere-active" youngsters just the kind of vicarious experiences in living they can feel most at home with. They can see and feel themselves making use of the artifacts of Nuvat's Arctic ancestors with him. They can milk cows and train steers with Almanzo in *Farmer Boy,* fight blizzards and grasshoppers and bears with Pa and Ma and Mary and the others in the (real) *Little House* sequence. They practice woodlore and camping with Dickon, as he lives with the Lenape Indians, and they can climb the rigging in Alan Villiers' schoolships.

Florman points to *The Iliad* as a source of aesthetic satisfaction as well as practical interest to the adult engineer, who relishes its exact description of construction details of ships and buildings and other vivid bits of reality. Perhaps it has the same bi-hemispheric appeal to dyslexic boys, such as those to whom George Hayes read it at the Linden Hill School, their natural bent attuned to his Homeric enthusiasm. An imaginative inspiration (and an enabling grant) gave him and his older boys a chance to explore the real Troy, sail the Aegean, play soccer with boys in Rome, and experience the Pillars of Hercules for themselves. It did not, in all likelihood, make epic poets or civil engineers of the boys, but neither they, George, the Board member who photographed it all, nor those of us who have seen the film are ever likely to forget the reality of that experience.

I think of Ralph, as bright and as dyslexic as they come at age 8, who became a voracious and independent reader of all the seagoing stories we had by 11, made and more or less mastered his own shop-built sextant at 12, and by 14, had become a knowledgeable authority on naval matters—history, ship design and marine lore. For him this was an intense but passing phase; he now has a double doctorate and a professorship in medicine and biochemistry—and a son as dyslexic as he was himself. One reads for many purposes—to learn how, to satisfy curiosity, to extend experience, to enjoy life, and sometimes as a precursor to a career. Ralph might have gone on, as did his younger look-alike, temperamentally twin fellow-alumnus who has sailed the waters of Southeast Asia in a small boat and, along with becoming a physicist, has written sea-going sagas himself.

Much, much more could be said about the uses to which one can put reading experience, but this is enough. Let us turn for a moment to the general criteria appropriate for selection of books for "our" children. Where can you get help in looking? You can ask the "voice of experience." There is none better than Dorothy Tower in her letter to her grown-up daughter, "Books and Children" (see Orton *Bulletin* XXIII or Reprint 60). Or, for fuller treatment, there are those standard library references: May Hill Arbuthnot's 1977 edition of *Children and Books;* Annis Duff's *Bequest of Wings*; and Constantine Georgiau's *Children and Their Literature.*

These and many others tell what books are available and what they are about, but they do not tell—because most librarians and their guides do not know—which volumes are for which dyslexic readers. For this there is no substitute for doing it yourself. Some librarians can be very helpful, others moderately so, but they are very much worth consulting, especially school librarians. So are some teachers; but the final judgment rests on your informed and responsive experience and your students. You will build your lists of books, as I have mine, and they will be among your best and quite indispensable teaching tools. Certainly you should not lean heavily on *my* guidance, especially for specifics.

I have told you somewhat autobiographically of just a few of the well-worn volumes I would pull again from my own shelves. In principle, I'll vouch for the choices, but your world and its children and its resources are different. To some extent, that is as it should be, though I find it an impoverishment that many young librarians and modern libraries are unaware of the still viable treasures with publication dates before 1969. This is as true here as it is in professional bibliographies, where only an occasional reference over 15 or 20 years old is cited, and even the products of the 1960's tend to be put in the half-price, stale-bread sales bins. On the other hand,you have undoubtedly noticed that most of the books I have referred to by title and most of the ones I have listed as the larger set I want to take to my desert island school for all-age dyslexics are very much out of date by publishers' standards. Such are the unfortunate facts of publishing life that many of the best books are out of print and not always available in even rather good libraries. Quite a few of them, a knowledgeable author of childrens' books tells me, would probably not be read spontaneously by most modern children, who really want—are sure they do—more of the here and now, social problem stories, and more science fiction. I agree with them on the merits of sci-fi. I am, in fact, quite a fan and have been since the early days of Heinlein and the rest. Still, I think I could "sell" almost any of my enthusiasms to the right child at the right time, just as I saw a fine male therapist at a summer camp a few weeks ago enjoying that social satire, *Fatapoufs and Thinifers,* with a 10-year old boy in just the way I used to do thirty-odd years ago. The principles are basically timeless. So, what does one look for in a good book?

In the first place, I don't think I could have a valid opinion on books for children unless I kept on reading adult books for my own information, growth, and pleasure. In literature as elsewhere, "What do they know of England who only England know?" One needs to encourage the "open personality" and a wide range of taste, at home as well as in the classroom and the clinic. I'll be attracted to a book if it is well-written by adult standards, with clear, felicitous prose (or verse, about which I have not spoken, though not for lack of enthusiasm), well-planned plot and characterization, accurate but well-assimilated and usually unobtrusive background research, clear explanation if its purpose is to give a matrix for further information. I'll be likely to use a book with students, and enjoy it myself, if it has humor and imagination and is alive and paced appropriately for its subject and readers, with the right amount of print on each page and chapter and between the covers. It should, of course, be appropriately printed, bound and illustrated with pictures of artistic worth and essential conformity to the facts of the text, and so arranged as to enhance without being intrusive. Then one can enjoy it aesthetically and physically as well as intellectually. Genuine sensitivity, not sentimentality, is important. It takes the genius of an E.B. White to address with satisfying subtlety, as he does in *Charlotte's Web,* such great moral issues as good and evil, justice and mercy, appreciative acceptance of one's own self and the precious difference of others, the whole business of how to meet the joys and vicissitudes of life, and the growth of real people in real and satisfying ways. But it is this kind of excellence we are looking for in a book for any age or reading ability.

Can books really touch the lives of children? I think Edward Eager knew when he gave his children in *Seven-day Magic* the experience and the words we may well listen to. Here is Barnaby, the prime idea-man among the five quite real, not quite prosaic children who were returning to the library with the book itself as a flying carpet, using the library roof as their heliport. The children were following Barnaby's lead. As the story goes from there:

> They went down a ladder and found themselves in the upper part of the library, where they had never ventured before because only grown-ups were allowed.
>
> "Think of all those books we haven't read yet," said Abby [the poet].
>
> "Maybe some of *them* have magic inside, too!" said Fredericka [the youngest].
>
> "*All* of them, I should think, said Barnaby, "one way or another."

Barnaby already knew, and perhaps said better than any of us, that if man cannot transcend himself and partake of the nature of his growing, innovative kinship with the Universal—his full humanity—it will not be for lack of stimulation and liberation provided *par excellence* in books. Those people, be they few or many, whom we teach to read with skill and enthusiasm and who use their skills to give them touch with their heritage and to feed their minds and spirits, make our game well worth the candle.

Dyslexia: Implications for Diagnosis and Treatment

Edwin M. Cole, M.D.

Former Director of Language Clinic,
Massachusetts General Hospital
Department of Neurology
Massachusetts General Hospital and Harvard Medical School

In recent years the sad state of reading in the school population of our country has received increasing attention. This has not come exclusively from educational journals; articles appear in newspapers and magazines decrying the fact that today's child has a low level of competence in reading. Spelling, however, is usually overlooked. Parents increasingly are dissatisfied with the end product of the expensive educational plants that they have built since World War II.

In all fairness, we must add that there are many other complaints about schools. We hear criticism about the lack of discipline, the inability to control vandalism, the problems of drugs, smoking, alcohol, sexual freedom, and physical attacks on teachers and fellow students. It is evident, then, that in our changing society the educational establishment is under fire for a number of reasons. I will limit myself, however, to discussion of reading competence.

Responses to Reading Problems

Visual Training

In giving attention to the sad plight of reading skill in school children, one group approaches reading as a matter of vision. If a child does not read well, then his eyes are not functioning well. This view is held despite the fact that many children with very poor vision, or vision just in one eye, can be and often are excellent readers. There is ample evidence for concluding that vision has rather little to do with reading. Nevertheless, many school systems and many unfortunate parents get involved in the expensive procedures of eye exercises, the use of devices to improve vision, and to increase binocular vision—in spite of the fact that it is evident that depth perception is unnecessary for reading. The Executive Committees and

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Councils of the American Academy of Pediatrics, the American Academy of Ophthalmology and Otolaryngology, and the American Association of Ophthalmology have approved the following statement:

> Since clues in word recognition are transmitted through the eyes to the brain, it has become common practice to attribute reading difficulties to subtle, ocular abnormalities presumed to cause faulty visual perception. Studies have shown that there is no peripheral eye defect which produces dyslexia and associated learning disabilities. Eye defects do not cause reversals of letters, words, or numbers.
>
> No known scientific evidence supports claims for improving the academic abilities of learning disabled or dylsexic children with treatment based solely on: (a) visual training (muscle exercises, ocular pursuit, glasses); (b) neurological organizational training (laterality training, balance board, perceptual training). Furthermore, such training has frequently resulted in unwarranted expense and has delayed proper instruction for the child.

Supervisors and Resource Centers

Educators and school administrators have tried to meet the needs of the situation by creating numerous supervisory personnel within the school system. Consequently, supervisors of reading have increased in number in most schools. Coincidentally, learning resource centers have been established in most schools. When a teacher finds a child performing poorly in reading, the teacher can appeal to the supervisor. The supervisor then attempts to do one of several things—perhaps arrange for testing by the school psychologist or arrange for interviewing by a counselor, in the hope that some emotional block or interference can be discovered which then will account for the child's reading problem. In other instances, the supervisor may recommend that the child appear one or more times a week in a resource center. What happens there is extremely variable. The well-motivated child supposedly knows what he needs and asks for materials and help of one sort or another. The resource teacher with ten or more students in the room tries to meet everyone's needs, and, consequently, each child very quickly is cast adrift. There are suggestions of motivating reading games, but there is little opportunity for solid, careful teaching. I am not in a position to question the value of resource rooms. They could be useful to teachers, but I very much question that they meet the needs of children severely handicapped in reading, the so-called dyslexic children.

Special-Needs Teachers and Learning Disabilities

Many schools have added, in addition to reading supervisors and resource rooms, a core of special teachers to work with reading-retarded children. Generally this work is in small groups; occasionally it is on a one-to-one basis. But certainly the efficacy of such help varies, depending on the training and experience of the special-needs teacher or tutor, as the case may be.

Learning disabilities—what does the term include? The blind, the deaf, the mentally addled, the mentally dull, the confused, the emotionally disturbed, the economically and culturally deprived, as well as children with a specific language disability? Grouping so many dissimilarities under one term can only confuse the issue and dilute the appropriateness of an educational approach to any one of these categories. The student in education presented with such diverse etiology, requiring such a variety of approaches, must be quite confused, must find it difficult to focus on one area. If we are considering the mentally retarded, that in itself is a large area worthy of study and development of very specialized techniques. If we are considering the disgruntled adolescent, that again is a field requiring much thought and a specialized approach. For the blind and the deaf, there are highly specialized techniques that are very effective in their way. Again, helping those culturally deprived, and consequently handicapped, requires very considerable work amassing materials and providing experiences way beyond the ordinary. And this is true too, for the learning-disabled child who suffers from severe developmental dyslexia. He, in turn, requires the application of quite different teaching techniques. I think we would be aided if we dropped the unclarified term of "learning disabilities." For each category, let us use the appropriate term, and let us call dyslexic children "dyslexic"—or better still, describe them as children having a specific language disability.

Specific Language Disability

It has been approximately 50 years since Samuel T. Orton first began to describe his observations of children who were failing in school. He early recognized a special group in whom such failure was due to inability to learn to read under the then current instructional methods. It has been over 40 years since his book, *Reading, Writing and Speech Problems in Children,* was published. In this book, he clearly indicated that reading was but one of an interrelated syndrome of functions. I well recall Dr. Orton's final advice to me when I left his clinic in New York in 1934 to establish my own clinic in Boston in that year. He said, "Whatever you do, don't call your clinic a Reading Clinic. Remember, it is a *Language Clinic.* It is the whole process of language that is involved."

As I have worked with language-handicapped children and adults through the many years since then, I have become increasingly impressed with the relevance of Dr. Orton's warning. It is an overall language problem that we are having to cope with. I have come to feel that usually the practitioners in these fields are addressing the tip of the iceberg. The visible tip may be what we now call developmental dyslexia, or it may be stuttering or stammering. It may be motor speech delay, or the persisting baby talk of language-handicapped children, or the poorly coordinated handwriting of those having special writing handicaps. Or, finally, it may be what we frequently fail to recognize, so-called word deafness—the auditory confusions which so frequently confuse and complicate the picture of developmental dyslexia. All these are protrusions from the same iceberg.

It appears to me that an extraordinary degree of fragmentation of the language processes has occurred, both from the therapeutic and educational point of view. For example, there are courses to increase reading speed—not so useful. There are courses to improve reading comprehension—certainly of value. There are specialists in schools to work with children who have a variety of articulatory deficiencies, including persistent infantilisms in speech and motor speech delay. There are others working with stuttering and stammering, presently called dysfluencies in speech—a pleasantly euphemistic term. Some teachers work to improve auditory discrimination, thereby aiding auditory perception. But I think few of these people recognize that they are working with aspects of a fundamental problem, which is the major part of the iceburg that is under the surface of the sea. Indeed, if we focus only on the visible aspects of the iceberg, we may find some day that the tip has disappeared and there is a quite different visible mass. This often occurs when the stutterer overcomes his stuttering with care and persistent work, and then remains a phenomenally poor speller and perhaps a rather limited reader. But, as Dr. Orton clearly saw, these are all aspects of one large language problem. It is based on genetic factors which we do not readily understand, but at least we can perceive them to exist.

It was Hinshelwood around the turn of the last century who was beginning to see numerous young people who he described as having "word blindness." Gradually he recognized that they were apt to appear in family groups, and eventually he saw a group consisting of two generations in the same family. This showed him that there obviously is a hereditary quality in "word blindness," which was the term he used to describe what we now designate as "developmental dyslexia." It was Dr. Orton's insights which carried knowledge much further: namely, that there is a relationship between certain laterality patterns occurring within family groups and certain language handicaps occurring in the same family group.

Clinical Evaluation

In making a diagnosis of a child with a specific language disability, it is helpful to make a careful clinical evaluation. This means starting with a detailed family history, especially as to language function. We know, in this field particularly, a child is the product of his forebears and often, unfortunately, of his forebears' deficiencies. The child's complaint may be deficiency in reading and spelling skills. It is relevant and useful, then, to know about the incidence of left-handedness in the family background, for we recognize that inevitably there are many "left-handers" in the family group from which the language-handicapped child comes. This does not mean that the dyslexic child, or the stuttering child, or the child with motor speech delay is left-handed. But in his family background we encounter numerous "left-handers." Similarly, we find other examples of language disability. He himself may have been a late talker, or he may have spoken with marked infantilisms, so-called cluttered speech, or baby talk, which is not infrequent. He may also have had a year or two of stuttering early in life. But if all these symptoms did not occur in the child in question (and let us hope they did not) certainly we find evidences of some of these handicaps in other members of the family. In the family group there is a high level of left-handedness, of some who have had developmental speech difficulty such as those described—stuttering, delayed speech, and persistent infantilisms in speech—as well as other members of the family group who have been dyslexic.

It is not always easy to obtain a full history as to these subjects, but unless we try, we certainly cannot find the history. Frequently, we encounter parents who are not certain as to the handedness in their own parents' generation, or even their own siblings. Frequently, earlier generations had fewer opportunities for developing skill in reading or speech, so that the familial language handicap may be less clear-cut. But where a full history is available, it is impressive how many of these symptoms of language disabilities occur. This, of course, was first noted by Orton.

No matter how striking the presenting symptom is—whether it is stuttering or dyslexia or some of the other enumerated language handicaps—we should be aware that weakness or insecurity in some other language-skill areas are apt to be present and should not be overlooked. I believe this is the reason we encounter marked inarticulateness in many, many dyslexics and why there are peculiar mispronunciations of words and syllables. Again and again in taking family histories, the parent says, "Oh, well, no one in his father's family could spell. His father can't spell, his grandfather can't, and an uncle or two have severe spelling problems. It's just a family trait." When one has the concept of an underlying specific language disability, family traits are much more readily comprehensible. Similarly we may hear, "Well, his grandfather never could pronounce certain letters. As a matter of fact, many members of that family have difficulty in making the sound of *r*. They tend to substitute *w* or *l*." It is thought to be a quaint familial trait. Indeed it is a familial trait, but more comprehensible as we recognize that several members of the family in which there is a fundamental language disability had difficulty acquiring correct speech sounds, particularly certain consonant sounds. The element of imitation, of course, can come into play here, but so often the individuals with mild speech difficulties are ones who were not thrown together because of differences in generation.

Language Interrelationships

Those of us who have worked with aphasic patients, attempting to aid them in regaining some lost language function, are aware of the interrelatedness of speech, understanding speech, visual language, reading, writing, spelling, auditory language, and even motor language. Loss of function in one area of language affects other areas. Through this understanding, some help for the aphasic patient can be provided. For example, a patient who has had a small stroke presents himself. As a consequence of the stroke, he has lost the use of his right hand, arm, and leg possibly completely, or possibly only partially. He is speechless. This, of course, is an appalling situation first of all for the patient, and secondly for those who are close to him. As we study this patient, we observe certain things. He is indeed speechless, or maybe he may emit one word or one or two sounds which are both inappropriate and indistinguishable. How do we help him to regain some speech? Motor speech mechanisms obviously have been severely interfered with. We recognize that auditory mechanisms, as with auditory memory of speech, play an important role in the formulation of speech. First, we observe that it is possible to help the patient produce some speech if something almost automatic is introduced to him auditorally, something which he knows completely without thinking, but which is stimulated by the speech he hears. Serial speech is obviously the place to begin. Usually I have found counting aloud of great value here. Using fingers to demonstrate, one says to the patient, "One, two three." And then gesturing to encourage him to attempt, we go over the "one, two, three." Pretty soon the patient may begin to name numbers appropriately, and can say, when he has started, "One, two, three . . ." and so on, for at least a short series. We then attempt to use other serial speech—things that may have been memorized and learned earlier in life, anything from Jack and Jill to the Lord's Prayer. If the patient is one who was in school when things were still "learned by heart," as the saying goes , it is a great help. Alas, the modern child knows little or nothing by heart—a flaw in present-day education.

So we eventually break the ice, or begin to thaw the tip of the iceberg, by attacking it through some of its connections. Speech, in this case, being the handicapped iceberg projection, which we attack through the submerged language function—in this case, auditory memory. I hope this analogy does not complicate issues. In like manner, the patient with motor aphasia is shown printed material, and is able to make letter sounds. Eventually he can combine letters into words. Through reading or visual language, his motor speech can also be reinforced. It is the same way with pictorial material. Similarly, we recognize that speech is motor performance, and as we improve motor skills, helping the patient regain some use of the leg and possibly some of the arm and hand, speech responds further. Sometimes we encounter a patient who was quite ambidextrous and so fairly readily can develop writing skills with the left hand, which is not paralyzed. But quite clearly what we are doing is associating the weakened or temporarily destroyed speaking skills with other associated language skills, which we hope are still retained—the auditory, the visual, the motor, the kinesthetic, and so on. Occasionally, even *touch* helps. The patient can produce a word if he feels an object. Soon we have the patient copying letters, writing words, naming pictures, and regaining much speech in this manner. We know how to do this if we understand the inter-relatedness of the various parts of the language process.

Another patient with a different lesion in the left hemisphere of the brain has become essentially alexic. He is unable to read at all. He has retained a good deal of speech, though speech will not be as fluent as it was previously. He will understand a good deal of what is said to him, be able to carry out commands, but is especially handicapped in reading. In this instance, we use our knowledge of language associations by working through speech and auditory memory, showing letters, naming letters, sounding letters, combining letters in words—a phonetic approach using visual cues.

Similarly we can learn a great deal about language organization in the individual through experience with a closely associated developmental language handicap, namely, stuttering or stammering. I use the two terms inter-changeably. In my opinion, there are many misconceptions about stuttering, chief of which is that it is a form of neurotic behavior, that stuttering is learned behavior. Rather, I would say, stuttering is an example of failure to master one of the language functions, namely, motor speech. Rather than being learned behavior, it is a failure in learning language behavior.

How can I substantiate this view? First, I would point out that the stutterer usually develops the symptom when he is presented with heavier demands on his language performance, particularly when starting kindergarten and first grade. It is then that he has to talk more and is presented with visual language in the form of printed letters and words. The burden is more than his shaky language equipment can support. In working with the stutterer, we learn that he, too, can develop some speech free of stuttering if he obtains auditory reinforcement. We use serial speech, reciting from memory, repeating what has just been said—all these are ways in which the stutterer can begin to produce free speech. In this approach, we recognize that motor speech is not an isolated function. It is related to auditory language, to visual language, and reinforced by association with these better performed skills. Usually the stutterer is more successful at producing speech when he reads aloud. This is considerably reinforced when writing exercises are associated with the reading. The so-called pencil facilitation method I have found to be of great usefulness for stutterers. So, not only are we using visual language, but also kinesthetic motor re-enforcement to strengthen uncertain motor speech.

The tip of the iceberg revealing itself in stuttering, of course, is motor speech. Because we know something about the iceberg mass under the surface of the sea, we can do something about the exposed tip through calling on the associations through the mass of the iceberg that will affect the exposed tip. So we use auditory and visual linkages, movement and kinesthesis as well. We also recognize that speech is a matter of movement and consequently posture. Good motor coordination aids the speaker. The stutterer is taught to move about, use gestures as means of reinforcing his speech mechanisms. We recognize that stuttering, like dyslexia, occurs on certain family trees, and in the family history of stutterers we frequently encounter dyslexics as well as a good deal of left-handedness. As a matter of fact, some children stutter because in early childhood they were shifted from a natural left-handed preference to a right-handed preference. That usually is not done much these days. But one still encounters such cases. When they occur, if the handedness is shifted back to the original preference, often remarkable improvement of the stuttering symptom occurs. That, of course, is not to say that all stutterers improve if we shift their use of hand from right to left, or left to right. Such is not the case. But it should be pointed out that in certain family constellations, several types of language handicaps. occur. This is what Dr. Orton first indicated. An interesting observation that I have been able to make in working with many stutterers is that generally the stutterer is a very poor speller. His language handicap, which, of course, is genetically based, is apt to be associated with another language weakness, namely, spelling, and sometimes even reading. Logical therapy for the stutterer in such instances is to improve reading and spelling as a means of improving speech.

Needless to say, the stutterer is disturbed, frustrated, embarrassed, and angry because of his symptom which retards his communication with his fellows. In a similar way, the dyslexic is frustrated, angry, and disheartened by his difficulties in mastering written, printed language. Naturally, anything which helps patients with either one of these language handicaps to accept themselves, tackle their problems, not to feel rejected, and improve self-image—any such thing is part of therapy. But such things do not constitute the chief aspect to be contended with. Fundamentally, what has to be done is to improve certain language mechanisms (I use that term for want of a better one) which are not well performed. The patient's attitude alone, or the changing of his attitude, is not going to do the trick. Knowing this etiological background, we could not conceive of treating stuttering through tongue exercises. Neither can we conceive of treating dyslexia through eye exercises. So, also, to improve any skill—be it swimming, tennis, or singing, to name but a few—requires complete understanding of all that is involved. The swimmer cannot just be taught how to kick his feet; he has also to know how to use his arms and how to breathe in the water. The student of tennis must learn about stance, use of feet, use of arms, use of eyes, grasp of the racquet, and how to coordinate. The singer has to do more than produce a note. He has to learn about breathing, about using his whole body to produce tones. He has to learn how to stand, how to use his arms, how gestures come into play. All this must be demonstrated to him who wishes to improve skill. But in addition to the demonstration go hours and hours of practice. Call it practice or repetitive drill, whichever you wish, but to master something takes a lot of hard work. It cannot always be pure fun, but true satisfaction comes from mastering a difficulty and thereby improving performance.

Treating the Dyslexic Child

But what about the dyslexic child? He is tremendously varied as to what his teacher can call on to help him compensate for and overcome his difficulty. First we must know what is the status of his other language skills. Is spoken language readily available to him?

I am impressed by the general inarticulateness of many dyslexics. They cannot read, and they cannot write and spell. Also a great many of them are handicapped in expressing their ideas through the spoken word. This skill should be determined, as it is one of the prime areas of remediation for many dyslexic students. They need help in producing the spoken word—producing it well. They need to know about the correct use of the body in speech, and about correct articulation. Often they need help in overcoming a variety of retained misarticulations. We need also to evaluate auditory language mechanisms. Is there good auditory discrimination? Does the student differentiate between similar sounds such as short *a*, short *e*, and short *i*. Or do they all seem more or less the same? Should reading work be accompanied by intensive work towards improving auditory discrimination? We must also investigate motor patterns, particularly those of the hand and the arm as used in writing. Is there poor coordination? If so, how can we work towards improving the hand and arm in developing clear, useful script? Finally, we want to know about the level of intelligence with which we are dealing. If the intelligence is of a high order, more can be done by working logically and by means of abstractions than with the dyslexic who is not so well equipped. In the latter case we would teach much more by rote and drills, using a great deal of repetition. Essentially, what we are trying to do with the dyslexic child is to show him that there is a quite logical way of mastering reading and spelling. This comes down to associating sounds with symbols, recognizing symbols through identification of the pattern of the symbol and its orientation in space. Much can be done here through use of kinesthesis in the writing hand by writing large letters and associating them with the letter name and the letter sound. For the highly intelligent and somewhat academically minded dyslexic, much assistance can be derived in handling his own language if he masters Latin (and perhaps even Greek), and approaches the intricacies of English through word derivation. This approach will work for some students, but it is not available to those who cannot handle the relationship of ideas that makes the study of Latin useful in the mastery of English. Of course, the fundamental process involved in helping the dyslexic student is that of teaching him to associate symbols with sounds and sounds with symbols, and, incidentally, symbols with spatial orientation and sequence. So far as I know, none of this is possible without a great deal of explanation, of demonstration, of repetitive work—and it is *work*. The student must be shown where he is going and why.

I think I need hardly point out that the severity of dyslexia varies a great deal between children. Some children are just a little bit dyslexic. They soon make a good compensation and read efficiently, but they may never become very accurate spellers. They may have a hopeless time with a foreign language. Others have a devastating experience in trying to learn to read. Between these two extremes, there is a continuum of cases varying as to degree of severity. I suppose it is fair to say that the degree of visual-spatial confusion in some instances is more severe than in others. Also, from what I have been saying, I am sure it is apparent that in some instances other language functions are strong enough to help the individual and make satisfactory compensation. For instance, auditory language may work extremely well for some students. Others may be very articulate, so that speech mechanisms are useful. Needless to say, some are extremely intelligent and it is easier for them to do the sort of learning requisite to overcome the visual-spatial confusions of dyslexia.

The Dyslexic Child in the Normal Classroom

One is moved to ask if there is anything that can be done in the so-called "normal" classroom to help children who have a moderate tendency to become dyslexic. I believe a great deal can be done. First of all, we should teach all children to recognize letters as entities relating to sounds. They need to learn the letter patterns; this means writing the letter in rather large and clear form. Then they need to associate a name and sound values to the letter pattern. The first step in reading, I am sure, is to develop some phonetic skill, so that the child begins to recognize that there is some logic in reading. It will not hurt the child who is a so-called "natural reader" and never has any difficulty with reading to know something about phonetics. For others, it makes all the difference between being able to read at all or not in the early grades.

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In using phonics, certainly we are emphasizing the importance of sounds. The instructor must be able to produce speech sounds clearly and correctly, and be able to aid the student in doing the same thing. This is not always easy, and it is here that some speech therapy in the school system can be very useful in the early grades. Also, teachers often need help in clarifying their own speech. In teaching the student to pay attention to sounds, we have to question procedures in the usual classroom. Instead of a quiet place in which sounds are made with purpose and meaning, the average classroom with its freedom of motion, its freedom to ask questions, is a place of considerable noise. It is thought best not to place too many constraints on children. What this does is to place great constraints on what can be learned by ear. In order to do their work, many students have to "turn off" their hearing.

A good example of what may occur is described in an account of a visit to a school in a Boston suburb noted for the excellence of its educational establishment. The newspaper report is as follows:

> On a recent morning, the teacher had five students in her reading room, each doing exercises out of work-books with names like *Effective Writing and Creative Analysis.* The atmosphere was informal. The teacher moved from desk to desk helping one student with grammar and another with vocabulary, all the while maintaining friendly banter about last week's football game and next month's college board exams. She encouraged a girl struggling with the word *sylvan* to read the real estate pages in the newspaper. She told students dealing with *acquiesce* to think of other words with the letters *q u i e.* The teacher said, "I try to put my students in the situation where they don't feel threatened or in competition. I give them a sense of language and a sense of words. A girl came in here and said, 'I did good on my English test.'" And the teacher said, "We all chuckled, but did not make fun of her."

To the reader, this sounds like a horrible mish-mash of experiences for the students, and what is the purpose of filling the air with banter about football games and college board examinations? It can only teach the student who is trying hard to work to "turn off" his hearing. I fear this sort of thing goes on far more frequently than we care to say. In attempting to let students be comfortable in the classroom, the teacher is apt to destroy much of the utility of the classroom as a learning place. I think the modern classroom can improve itself for the average student by increasing quiet, emphasizing the need to listen to what is said, and hence to make use of spoken clues. The more traditional form of recitations with one student speaking, answering questions, propounding a thesis, and others listening and participating, is a form of learning which we need to restore. Individualized learning, each student working on a work-book at his desk with different material and no use of the spoken word, misses using valuable avenues of learning.

I am impressed with how few children in the elementary grades whom I see know any poetry. No attempt to stimulate rhyming, imitation of sounds, use of sounds has been made. The model of poetical language has never been used for many children. I think that this is an unfortunate failure to develop a good ear for language. Speaking in unison can be a good way of learning, and it could be used for more than just pledging allegiance to the flag. Oral speech produced by the teacher, heard and understood by the pupil, and correctly reproduced by him, is a fundamental language process which has been sadly neglected. If utilized, it could aid many mildly dyslexic students.

Something should be said about motor language, by which I mean writing. Frequently I encounter children who have had little or no instruction in writing. Generally manuscript printing is used in the earliest grades, and then the child seems to be cast adrift with no attempt made to help him produce cursive script. Why would cursive script be useful? For some very fundamental reasons. It is much more difficult to reverse the letter pattern in cursive form than in manuscript form. Also it is more difficult to reverse the sequence of letters in cursive than in manuscript. But what I think is most important is that in free cursive script we use more muscular power control, more movement than in the small manuscript, which depends largely on finger motion.

Cursive script, then, gives a more distinctive pattern for each letter, which can be learned in the hand and in the arm, than does manuscript. If we want to help the child develop cursive script, of course we have to face the problem that a great many teachers use only manuscript themselves. I have seen classes in which the teacher is struggling to encourage children to use cursive script, while she herself writes on the board in manuscript. Naturally, under such circumstances, progress is very slow. It is of extreme importance for the potentially dyslexic child to learn distinct letter patterns. He has to be shown. He has to practice. He has to master the forms.

In the modern classroom, a great deal has been accomplished in stimulating the interest of students, calling forth their participation, and permitting them to make use of their originality. All this is fine. But I cannot believe that in order to accomplish these ends we have to sacrifice what can be learned through group work, through the good use of auditory language, listening, and making use of what one hears, and motor language in the form of good clear writing.

Throughout this discussion, I have referred to the occurrence of various language handicaps within family groups and their association with left-handedness within the family group, as first pointed out by Dr. Orton, and how important it is for the teacher working with dyslexic students to recognize the inter-relationships among different aspects of language performance. The case histories given below are illustrative.

Ben

In April 1978, a 15-year old boy, whom we will call Ben, was brought in by his father. He had had all his education in a public school in a suburb of Harrisburg, Pennsylvania. Although he had always had difficulty with mathematics and reading, he had had no tutorial support.

In the developmental history, I noted that Ben was quite late in beginning to talk, which probably did not occur until he was two or two and one-half years of age—evidence of motor speech delay. Ben is the youngest of 5 children. One sibling is left-handed, and a paternal uncle who is left-handed has had severe developmental dyslexia. Ben's mother claimed that she had been a poor reader and poor speller. In the clinical interview, Ben seemed well matured for his years. He was affable and able to discuss a variety of subjects. He was completing the 8th grade in his local school at the age of 15, having repeated one grade along the way.

Psychological and achievement tests were administered, and showed him to have average intelligence, with his non-verbal intelligence being at a bright-normal level, and his verbal, just average. Academic achievement tests showed that his arithmetic performance stood at a beginning 8th grade level; his reading comprehension at a mid-6th grade level; vocabulary at a 7th grade level; mechanics of reading at a 4th grade level; and spelling at not quite a 5th grade level—all low scores for a bright student entering grade 9. There were many of the typical reversals of sequence and letter confusions which we see in dyslexia. Ben had never been a reader, and it was clear, on the basis of performance and family history, that he suffered from developmental dyslexia which never had been recognized. After six weeks of tutoring during the summer, he had improved considerably in his silent reading skills, though they were not up to grade level, and his spelling had shown a gain of a little over a year. He planned to attend a school in the autumn in which dyslexia was recognized and tutorial support could be continued for him.

In the discussion of this case, Ben's father said that his brother had been seen here for the same complaint in 1938, which indeed was so. The brother had been left-handed, was a poor reader and a very poor speller, but with a superior level of intelligence. This man's uncle had been a notoriously poor speller. Here we have dyslexia exhibited in at least three generations. Ben's uncle had a lot of individual tutoring, was able to handle a demanding secondary school program, went on to college, was graduated from medical school, and now is a successful surgeon on the Pacific Coast. I add this as encouragement to those teachers and parents who feel that a dyslexic child cannot get anywhere. That is not true.*

Bill

Bill was brought in by his parents when he was nine and one-half years of age. His is a striking family history. He came because an older brother was suffering from developmental dyslexia, was in a special school for dyslexic children, and the parents were disturbed that Bill did not seem to be handling school work as well as they expected.

In the developmental history I noted that for a while there had been a slight degree of stammering in his early speech development. Bill is the second of three children. He is left-handed with considerable ambidexterity. As noted above, his older brother has developmental dyslexia. Bill's father is left-handed with marked ambidexterity, and his brother is left-handed and used to stutter. Bill's father had two other brothers who had difficulty in reading and had to have considerable tutoring in school. He also recalled that he had two left-handed uncles, one on each side, and that his own father was a very poor student. Bill's mother was right-handed but her sister was left-handed. The sister's son has stammered quite severely and has a bad time with reading.

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*For other well-documented examples of dyslexic individuals who developed successful careers in a variety of fields, see *Developmental Language Disability: Adult Accomplishments of Dyslexic Boys*, by Margaret B. Rawson. (Originally published by The Johns Hopkins University Press, this book has been out of print for some time and is being reissued by Educators Publishing Service, Inc., 75 Moulton Street, Cambridge, Massachusetts 02138.)—*Editor*

In the educational history, I noted that Bill, though nine and one-half years of age, had just completed the 2nd grade in a small, independent school. In that school he had had several years of nursery school, one year in transition, one year in kindergarten, and a year in connecting class before entering the first grade and continuing into the 2nd grade. Quite clearly this history suggests difficulty in the early stages of school work.

Testing showed Bill, at nine and one-half to be at least ten years of age as to mental maturity as measured by the WISC. So we considered him to have average intelligence. He was completing the second grade, but all his academic skills were very weak. Mathematics, silent reading, oral reading, and spelling were all at a low 2nd grade level. The quality of the work, showing reversals and letter confusions, clearly indicated that Bill had suffered from a severe degree of developmental dyslexia. He went on to a school where special tutorial help was provided, and where the program is designed to meet the needs of dyslexic students. I am glad to report he has made very considerable progress as has his brother.

John

In June 1978, John was brought in by his parents, who lived in Rhode Island. He was twelve and one-half years of age at the time, and his parents were concerned because, though he had been diagnosed as having a learning disability a good many years before, he had made little, if any, progress. Actually, he had been treated medically for a number of years with Ritalin and various other drugs but he had had none for the past several years.

In the developmental history, I noted that John was late in talking. He did not speak until he was two and one-half years of age, and there was marked cluttering in his early speech. The family history revealed that John is the second of four children. He is left-handed. A younger sibling is a very poor speller and has had severe learning problems, and his early speech displayed a great deal of cluttering. Both parents are right-handed, but two maternal uncles are left-handed, and one maternal uncle is a stutterer. On his father's side, a brother had severe reading problems.

After attending the local public school for three years, John transferred to a special school where he was on medication and apparently had special class work to overcome a learning disability. This included weekly work with his speech. His parents pointed out that John has remained well-motivated, though he is troubled that he has made so little progress. They had observed *b–d* confusions and reversal of order of letters in words.

He had started doing some pleasure reading, but has restricted himself to comic books.

In the clinical interview, John was a friendly, responsive boy, who seemed unusually self-possessed for one of his years. A rather extensive battery of psychological and academic achievement tests was carried out. On the basis of the data these provided, it is clear that John has average intellectual functioning but that all his school work was well below grade level. Mathematics and reading comprehension were at a mid-5th grade level; vocabulary at a mid-3rd grade level; reading accuracy at a mid-3rd grade level; and spelling at an upper-4th grade level. The types of errors were typical of dyslexia and consistent with the clinical evaluation. This boy clearly needs intensive help on a tutorial basis to overcome the dyslexia which has handicapped his whole school career.

Tim

In March 1977, a family from the neighborhood of Cleveland, Ohio, arrived in the office with their son, Tim, whose age was nearly 15. They were concerned because his language skills seemed very retarded, and in many ways he seemed somewhat immature.

The developmental history was not remarkable in any way. The family history revealed that Tim was the older of two brothers. He and his sibling are both right-handed. The younger brother has been slow in learning to read and is a poor speller. Both parents are right-handed, but the father's brother is left-handed and the father claimed that he had had severe difficulty with reading and spelling himself. He had always been very poor in foreign languages and when in school had much remedial reading help. The father claims that his brother also had severe dyslexia and the brother's son is similarly afflicted.

The educational history showed that Tim attended the local public school through the 6th grade. He worked with resource teachers, receiving some extra help in that way. Summers he had tutoring with a teacher who lived in the neighborhood, and generally the diagnosis of reading problem was made. He transferred to a local independent school in the 7th grade, and was completing the 9th grade when I saw him. At that time, his parents stated that there were still marked letter confusions, a tendency to reverse the sequence of letters in words, and that he did no pleasure reading.

In the clinical interview, Tim seemed a pleasant, responsive boy, but somewhat guarded. He became very ill at ease when I asked him to do some writing, and it was soon clear why. He was unable to spell most of the words which he was to use. An extensive battery of tests was administered. On the basis of the data these provided, it was clear that Tim was a boy with superior intelligence. Although his performance in mathematics was well above grade, all his reading skills were weak, ranging from a 5th to an 8th grade level. Spelling was at the first percentile in the Lincoln Diagnostic Spelling Test. Clearly, on the basis of history and performance and quality of his work, Tim is suffering from severe developmental dyslexia. On the strength of our findings, he attended a six-week summer school course in which he made considerable progress. He then transferred to an independent boarding school, where the tutorial work which had helped him in the summer could be continued.

A little bit over a year later, Tim returned to the office accompanied by his parents and younger brother. He was quite a transformed fellow, much more self-assured, happy about his work, passing all his courses, and enthusiastic about school and what he could accomplish there. However, the parents were concerned about the younger brother, who had been described a year earlier as being dyslexic. Testing in his case showed that at eleven and one-half he had a mental age of 13. He was about to enter the 6th grade. Mathematics and silent reading were at grade level. Other reading skills, such as rate, accuracy, and particularly spelling were all at a 4th grade level. On the basis of these data, it seems clear that the brother is the second boy in the family to suffer from developmental dyslexia, and he will require a good deal of individualized instruction.

Jerry

In April 1971, Jerry, a 17-year old boy from Iowa, came in accompanied by his parents. He and his parents had been baffled by his complete failure in school work. Jerry is the second of three children. He and his siblings are all right-handed, but his younger brother is quite ambidextrous and is known to be left-eyed. The younger brother is a poor student, has had difficulty with reading and is a poor speller. Both parents are right-handed. The father recalls having early difficulty with reading and spelling. He had tutoring throughout his educational career, including medical school, but says he is still a very poor speller.

The school history revealed that Jerry attended his local public school, repeating the 3rd grade, and continuing through the 8th. He had had a variety of tutors, but no one seemed to be certain what the trouble was. He then transferred to an independent school in Maine. And there again, though we were seeing him at the end of his 10th grade year (his second year at the school), no one seemed to be certain why he was failing to achieve well.

In the clinical interview, Jerry clearly was a concerned, troubled, and baffled young man. Testing indicated that he well might be. At 17, with average mental aptitudes and approaching the end of the 10th grade year, his academic skills stood very, very low. Mathematics performance was at a 6th grade level; reading comprehension at an 8th grade level; and spelling at a low 5th grade level. I might add that his morale was at an all-time low. He attended summer school, where he had six weeks of intensive tutoring. He made some progress, but it was slight. Then he transferred to a school specializing in the education of dyslexic students, and from there he was graduated. However, his ideal has always been to go to college, and in this, I am sorry to say, he has been frustrated. He has not been able to handle college work. I would add that 17 is far too late to work therapeutically with a severely dyslexic student.

In June 1973, Jerry's younger brother Al, appeared. At that time Al was just 18 years of age. All his education had been at the local public schools, and he had been graduated from high school. He had never done very well, but his mother says he has never had any failing marks "largely because the school saw he was an intelligent boy and didn't want to discourage him." Al had never had any special help, never any tutoring, and his difficulties had not been recognized as being specifically in the language area.

In the clinical interview, Al was a pleasantly responsive, quite mature boy, who seemed interested in finding the reasons for his academic difficulties. Consequently, an extensive battery of tests was administered and showed high average intelligence. His silent reading skills showed his comprehension to be at a 57th percentile, his vocabulary at a 24th percentile. But his spelling score stood at a 2nd percentile. This was the weakest area in his educational profile.

With these data at hand, Al decided to enroll in an intensive course of one-to-one tutoring during the summer for a six-week period. This he did, making some improvement, and in time, though with difficulties, Al completed a college course.

Here are two brothers, both of them intelligent lads, with good family backing. The older brother's problem was never recognized, and at 17 years of age, I really think it was too late to accomplish a great deal with him. The younger brother's difficulty was not as severe, and he managed to make use of extra tutorial help and to complete a college course.

Summary

I have indicated the relationship between a variety of developmental language problems, speech problems, as well as reading and writing problems. It is important for those working with dyslexic students to recognize the possibility of reinforcement by associating one faulty language skill with other language skills perhaps less poorly developed. In making the diagnosis of dyslexia, which is not always easy, it is well to know the family background. And to illustrate this, I have cited a number of clinical case histories.

Program Planning for Dyslexic Children in General Education

Genevieve G. Oliphant, Ph.D.

Principal, San Miguel School
Lemon Grove School District
Lemon Grove, California

The planning of an educational program for a dyslexic child is dependent upon a number of factors, all of which must be considered. Of prime importance to the first step is the definition of dyslexia as a *specific language disability*.

The definition of specific language disability must be clear enough so that diagnosticians will be able to differentiate it from other categories of learning disabilities. As Cruikshank (1978) pointed out in an address to the Association for Children with Learning Disabilities, the term, *learning disabilities*, "is not functional; it leads to nowhere." Subsumed under the heading "learning disabilities" are problems in learning which may result from diverse causes. Specific language disability is one problem; it is not the same as the problem of the learning-disabled, hyperactive child, of the learning-disabled emotionally disturbed child, or of the learning-disabled brain-damaged child.

The problem of definition of learning disabilities in general is a challenging one. The terms used in Public Law 94-142, for example, include such categories as perceptually handicapped, neurologically handicapped, minimal brain dysfunction, language disordered but not aphasic, and dyslexic. These can be "grab bag" terms, difficult to define precisely or to diagnose differentially with any degree of assurance. Indeed, in some cases more than one of these terms could be applied to the same individual. A diagnosis of a specific language disability, however, rests upon the following:

> The children referred to as having Specific Language Disability are those of normal to superior intellectual abilities whose difficulties are in all or some parts of learning to read, write and spell and in oral and/or written expression. These children are not mentally deficient, not brain damaged and not primarily emotionally disturbed. They

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This article is based on a paper by Dr. Oliphant at the 29th Annual Conference of The Orton Society in Minneapolis, November 1978.

may have emotional problems involving negative behavior and attitude as overlays due to inadequate school performance and achievement in the area of language. They do not have learning problems per se and their learning difficulties are not of global proportions because they can, *and do*, learn readily in other fields, hampered only by inadequate use of language skills (Slingerland 1977).

Orton (1937) listed the following characteristics among those displayed by dyslexic individuals:

1. An inability to recognize written words or guessing them even when the result is without meaning or sense.
2. Reversal tendencies and instability of form perception.
3. Inability to spell in writing even when able to spell orally.
4. Ability to write words but then not able to read them.
5. Poor spelling with rote memory drill of little assistance.
6. Problems with handwriting.
7. Complicating auditory word difficulty in hearing clearly, categorizing, and in retrieval.

Over ten years of study, from 1927 to 1937, Dr. Orton found one factor common to all children with specific language disability—a difficulty in repicturing or rebuilding in the *order* of presentation, *sequences* of letters, of sounds, or of units of movement (Orton 1937).

Educating the Dyslexic Child

Once we have located children with these characteristics, we are faced with the problem of educating them. Some dyslexic children have problems so severe that they are in obvious need of the individual help which is available only through special education. There are, however, other dyslexic children who are struggling along, managing to function in the classroom but not at a level commensurate with their intellectual ability. Generally their difficulty is not considered severe enough to qualify them for special education. In fact, there are too many of them for such services; estimates run from 10 percent to 20 percent of school-age children. The costs of special education for this number of children would be prohibitive. Therefore, the issue seems clear—the challenge to meeting the educational needs of these children is to general education.

The Education for All Handicapped Act, P. L. 94–142, requires school districts to provide special education and related services to all handicapped children, with attention paid to mainstreaming and to the least restrictive environment. If school districts cannot provide these services themselves, then they must pay the costs to an outside agency. Built into the law is a requirement for the parents to be actively involved in every step of the process. Such parent power, in association with the requirements of the law, is causing school districts to begin the development of additional plans to meet children's special needs.

Accompanying this is the groundswell across the nation for a "return to the basics." There are many who are critical of the performance of our schools in teaching basic skills in arithmetic and in the communication arts—speaking, reading, writing and spelling. They are demanding accountability through proficiency testing. In California, for example, the requirement for periodic proficiency testing has become a part of state law. Included in the law is the requirement to draw up a special program plan for each youngster who performs unsatisfactorily on the proficiency tests. This is all within the framework of general education, not of special education. Other states are also turning in this direction, and the press reports nation-wide "flunking" of children who do not meet certain grade standards.

The current emphasis on the "accountability" of general education may signal some dangers in the future. First, parents may gradually begin to pull away from agreeing (or demanding) that their children be identified as "handicapped" in order to qualify them for special assistance. This might become especially true of parents with dyslexic children. "Handicapped" and "disabled" are emotion laden words, often shocking to parents in relation to their SLD child. Special education is a category which they have not considered as appropriate for their child. In addition, parents are becoming aware of the high costs of special education services, as well as of private tutoring. General education, many believe, is expensive enough. "What's the matter with general education," they may ask, "that the classroom teacher can't teach children who are not stupid what they need to know?"

Secondly, parents are turning away from blaming the child for not learning (*don't be so lazy; you have to try harder; you need to be neater in your work; why don't you listen?*) to placing the blame upon the schools. If this trend increases, as I believe it may, educators will be in a very uncomfortable position.

It is a human trait to look elsewhere to place the blame for failure, especially if that failure is painful. Parents have blamed teachers, and teachers their education professors—for not teaching them how to deal with special problems—and their administrators for not providing the necessary leadership. Or they blame psychologists and neurologists for providing the label for the child's problem but not providing adequate help in dealing with the problem. Parents are criticized for not helping the child, and the child for not trying hard enough. The futility of seeking a scapegoat for educational failure is self-apparent. The better part of wisdom indicates that we should be working to formulate a plan to meet the special needs of dyslexic children.

The Need for a Plan

Every plan should take into account not only the dyslexic child's difficulties in the language arts but also his emotional adjustment and his view of himself. We have only to imagine ourselves placed in a situation where we fail daily at tasks which others are completing satisfactorily to experience in a small way the pain of the dyslexic child. Many of these children know before they have completed first grade that they are in trouble. Small wonder that each year of failure brings deeper pain and resultant antisocial behavior, either acting out or withdrawal. We cannot assuage this pain by assuring a child that he is doing well when he knows he is not. There are other ways, however, to assure the child that he is a worthy individual. As Behrman (1975) wrote, we need to teach a fourth *R—respect*. We can show respect by removing classroom pressures. We can be patient and *honestly* so, not merely pretending to be so while in fact we are seething with impatience. That charade fools no one.

We must accept each child as he is, without passing judgment. This does not mean that we accept undesirable behavior, but it does mean that we endeavor with our utmost energy not be be deviled into anger. Above all, we must listen and respond in such a way that the child knows that what he has to say is important to us.

Steps in Educational Planning

There are some steps we should take if we truly wish to provide for the dyslexic child in our community. The manner by which these steps are carried out may differ from one community to another, as there will be certain unique aspects in each situation. There could be six steps in such an educational plan.

Identification of the Problem. First, we must identify the problem. Just what is it that concerns us, roils our blood, or pains our hearts? Is it the teachers who leave early, yet never devise work for individual students' needs? Is it the anguished exasperation of parents? Is it a duty-free lunch period that looms large in our value system? Or is it the child who appears to be intelligent but who reads poorly or writes with painful hen-scratches and such inaccurate spelling that his writing can scarcely be read?

If the problem is this child, then how do we know that he is intelligent? How do we know what his trouble really is? One aspect of the delimiting of any problem is a defining of the population or group to be considered. This includes diagnosis, as detailed and as accurate as can be obtained. We cannot always obtain neurological and complete psychological evaluative data on all children about whom we are concerned. We certainly are glad to receive any such reports that are available. But we must *not* let the lack of such information stop us. At each obstacle that rises before us, we should ask ourselves, "Is this difficulty really insurmountable, or can I hack a path around it or dig a tunnel through?"

There are tests that a teacher can use, tests which yield considerable diagnostic information. The Slingerland Screening Tests for Identifying Children with Specific Language Disability (Slingerland 1967, 1977) offer one such tool. These tests are available in five levels, from pre-reading through sixth grade. Subtests yield data in visual perceptual functioning, kinesthetic-motor functioning, and auditory-visual-kinesthetic functioning. The tests can be administered to groups, which enhances their usefulness. As with all tests which yield diagnostic information, administration of the tests and the scoring require careful study of the manual. The tests are not standardized, although reliability and validity research is being undertaken this year. Slingerland recommends using local norms along with a detailed judgment of each child's performance relative to the information available about that particular child. She also strongly urges that test administrators not be misled by a focus on score without regard to other information.

In addition, teachers can evaluate disabilities through types of spelling errors, as suggested by Boder (1973). Boder has outlined three types of dyslexic patterns revealed through a spelling test. One type, dysphonetic dyslexia, refers to problems in phonetic word-analysis or auditory perceptual disabilities. A second, dyseidetic dyslexia, refers to difficulty in perceiving words as wholes, or forming the visual gestalt of words. The third shows mixed problems. Within each group, however, there can be many variations and gradations. Teachers can make much the same kind of evaluation by giving a spelling test composed of phonetic and non-phonetic words and phrases or nonsense syllables, then analyzing the types of errors.

A great deal of valuable information can also be gained through the following procedures:

1. Prepare two short reading selections at various reading levels. Ask the child to read the first one silently, timing speed with a stop watch. When the child is finished, ask him several comprehension questions. Next, have the child read the second selection aloud, again timing his oral reading speed. On a second copy, mark all reading errors, repetitions, omissions, and hesitations. Continue until the child's reading is so poor that he could not read independently at that level. This test compares a child's oral and silent reading patterns, reading speed, and types of oral reading errors, as well as reading level. It can yield a great deal of diagnostic information upon which to base a program.
2. Flashing untimed word lists also can reveal important information. Prepare word lists at several instructional levels. Expose a word for one second, either by flash card, or by shifting a card with a slot cut in it. If the child reads the word, continue to the next. If he misreads the word or does not know it, re-expose the word to see if he can decode the word. Sometimes, a child just needs a second look in order to know the word. Research has shown that dyslexic children often have slower perceptual speed than children who read normally, and they really do not recognize words quickly, although the gestalt has been formed (Barrett 1965; Colarusso, Martin and Hartung, 1975; Goins, 1958). The flash-word test taps this skill, as well as the child's ability to decode.
3. Various tests of auditory skills are good to use, also. For example, a test requiring repetition of multisyllabic words can evaluate a child's auditory-vocal sequencing capabilities. The child is asked to repeat the word, such as *spaghetti* or *hospital*, three times. Tests of auditory discrimination and synthesizing can also point up areas of weakness. In addition, the child may be asked to listen to a short story with well-defined sequences and then to retell the story. Weaknesses in auditory memory of sequences on a conceptual level may be revealed in this task.

Also, teachers can note, by watching and listening to the child as he reads, writes and speaks, whether his performance is atypical for an alert child of his age. Is his work erratic, with peaks and valleys, depending upon the subject matter, or with variations from one day to the next? Teachers should not depend upon their memories, but should take notes and keep samples of the child's work to review later in a search for a pattern of abilities and disabilities. Notes should be organized under types of errors, i.e., visual memory, visual sequencing, auditory sequencing, auditory memory, or integration. A pattern will usually appear and can be accepted with confidence.

Once the teacher has identified some children with difficulties in the language arts and feels they are intelligent children, but show some characteristics of dyslexia, there may be another part to the problem. The administration in the school district may not believe dyslexia exists, or the superintendent may be committed to the open classroom concept.

Building a Commitment to Solve the Problem. What can teachers do once they have identified the children and the problem? They can commit themselves to solve the problem by setting a goal to reach.

There should be a set time limit and the goal should not be so ambitious that it is impossible to fulfill. It might be as simple as this: "Each day for the next two weeks, I am going to talk to one of the teachers on the staff about the specific problems of dyslexia and show samples of work by children in this school that reveal these weaknesses. I will not argue or try to persuade anyone to teach differently. __________ (a colleague) will help me by going over the material with me, listening to me as I practice what I am going to say, and will give me suggestions. At the end of two weeks, I will evaluate the progress."

Increasing Self-Awareness. The third step in the plan might be to increase self-awareness, not only of the dyslexic problem but also of the atmosphere, cooperation and spirit of the staff.

This includes looking with new eyes at the children in the classroom. Of the lowest 25 percent to one-third of your class, how many have global problems and should perhaps be referred to the school psychologist for study? How many seem alert and are trying hard but cannot remember words from one paragraph to the next? In other words, how many have the earmarks of specific language disability? What about the middle third of the class? Are there children there who are struggling to keep up the pace, like the child learning to tread water who paddles frantically just to keep his nose above the surface? Are there children who seem to be reading all right, although their comprehension is not always good, and whose spelling is very poor? These are the children who need special help, also. Teachers could begin listing the names by class and grade level, with the types of spelling errors noted. One child, for example, might show auditory strengths accompanied with visual memory problems. This might be seen in the attempt to write irregularly spelled words phonetically, or in the confusing of the spelling patterns of various vowel sounds.

Administrators should familiarize themselves with the work being done in the classes. This can be done not only through frequent visits to classrooms but also by asking to see samples of children's written work, perhaps on a classroom rotation system. A principal will learn quickly by chatting with teachers about these children which teachers are approachable and anxious to learn and which might reject any notion of change.

The Plan of Action. The fourth step to be accomplished is the development and implementation of a plan of action to help the children. All of the work up to this point has been in preparation for this step. The success of the plan will depend upon how carefully the initial steps have been taken, as well as upon the action plan itself. The teacher is handicapped if the principal does not approve; principals will fail if they can find no teachers who will work with them. Of course, in any school district, the approval of central administration is critical to the success of any plan of action. District-level administrators need not necessarily support the plan wholeheartedly at the beginning, but they must be willing to give it a chance.

There may be many points built into a specific plan of action, including a method of screening for early identification and special training for the teachers who are willing to take on the special task of education of SLD children.

There are certain criteria that are essential in the development of an educational program for dyslexic children, and such a program should be evaluated in the light of these criteria. The suggested techniques and criteria given below are based upon the Orton-Gillingham approach and its Slingerland adaptation to the regular classroom (Gillingham and Stillman 1966; Slingerland 1971).

First, the teaching techniques must be genuinely multisensory. Multisensory is a term that has been over-used by educational publishing houses to describe almost any material from their presses. It is important to know precisely what is meant by multisensory in the context of educating the SLD child. Briefly, the teacher employs visual, auditory, and kinesthetic avenues of input *simultaneously*. The key word is "simultaneously." It has been noted that responses to stimuli occurring at the same point in time appear to form a neurological relationship. Triggering one response often calls for the other. For example, if a child has a severe problem recalling the names of letters of the alphabet, he may be asked to trace a letter (visual plus kinesthetic) and at the same time to say the name aloud (auditory input plus motor speech). Later, if the sight of the letter does not trigger the name, beginning the act of tracing may be enough to retrieve the word.

Such an educational program moves slowly at first. The teacher is not teaching facts only, but is developing a channel, a system by which the children learn. As a part of this system, there is much repetition, but never mere rote drill. SLD children (and perhaps most of us) tend to "woolgather" on tasks done by rote, and limited learning takes place.

Another point to consider when developing this educational program is an emphasis on cognitive processes. Since by definition these are intelligent children, we should make certain that this intelligence is put to use. This means that at all times the child with specific language disability should know *why* he is doing what he is doing. He should be able to explain concepts at his level of maturity. It should be clear to him that he is learning the tools of communication, and that the goal is communication and not just spelling and decoding words.

Beginning with the first pre-primer, the emphasis must be on reading comprehension. Oral reading should never be done word by word. Instead, the child should be taught to group words by thought units. From the first, children can begin to grasp story sequence, inference, and learn to anticipate future actions in the story.

This means, of course, that the stories must have *meat* to them. Not much can be done with "The fat cat sat on a mat," in teaching reading comprehension. I do not believe that it is necessary to teach decoding skills before beginning to work on comprehension. On the contrary, it is important that these learnings are concurrent.

Education for the dyslexic child should begin with the auditory modality. Even before formal reading and spelling instruction is initiated, instruction should be given in vocabulary development, perception of sounds, and oral building of phrases, sentences, and paragraphs. The child should learn to listen for specific points and to speak to specific tasks. For example: the teacher might ask for a phrase that tells who. The child might respond, "The big dog," and then be asked to give a phrase that tells what he did, such as "ran down the street." He would then be asked to put the two phrases together to form a complete thought (Slingerland 1971). In much the same manner, paragraphs can be put together, with an introductory sentence, a body, and a concluding sentence. This can all be accomplished before a child's writing skills have reached the point where he could be asked to write a sentence or a paragraph. The key is the fact that he understands what he is doing and why.

One of the most important areas is that of parent education. Parent support is critical to the success and continuance of any special program. Therefore, any action plan should state specifically the arrangements that are being made to enlighten parents about specific language disability and to work toward their commitment to the program as it is developed in that school.

There should be a timeline in the plan, with a provision made for periodic assessment of progress. Change and revision of the plan should always be possible. Like the educational techniques with which the children learn best, the plan needs to be carefully structured but not rigid.

Evaluation of the Plan. The number of times an evaluation will be made will depend upon the circumstances. Having observed a number of programs, however, it is my feeling that many founder because teachers are required to do so much testing for evaluation that they become frustrated and give up. Requirements for testing and charting cannot be permitted to become onerous or the program, no matter how worthy, is doomed. Twice a year should suffice for any formal evaluation of progress. Although this may be too often to evaluate clearly the progress of the SLD child, as demonstrated by responses on standardized tests, there are other aspects of the plan which should be evaluated.

For example, the accuracy of the tests that were used to select the children for the special help needs to be checked. Were there some children who were selected as possible SLD children who showed no difficulty once teaching was instituted? Even more importantly, were some children missed who subsequently encountered problems in reading, writing, or spelling? Where specifically are their problems? Which parts of the tests are the least accurate? Are these children's difficulties truly due to specific language disability or are they caused possibly by poor home environment, transiency, basic emotional problems, or perhaps because the child is a true slow learner?

Then we approach a philosophical question which requires an educational decision. If we decide that a second-grade child's reading disability may well be caused, or at least exacerbated, by the fact that he has been enrolled in seven or eight schools in his short school career, do we then declare that he is not eligible for the special program plan because he is probably not dyslexic? Do we assign him to another teacher with the hope that she will be able to plan an individualized program that will meet this child's needs? Do we assign him a slot in the SLD program, with the notation to evaluate frequently and transfer him to a regular program if he responds quickly? What if the spots in the SLD program are limited? Every school which offers special programs, for whatever reason, finds itself on the horns of this dilemma when choices must be made. My personal philosophy is that the SLD child with a stable home environment has priority over the child whose family is transient, if a choice must be made. Too often, I have worked hard to arrange special help for a child from a transient family only to have him move on in a month or two. Children of highly transient families, unless they are very bright, can scarcely avoid an education containing gaps. And that is a different problem from specific language disability.

All persons working in a special program for dyslexic children need to be involved in a yearly evaluation. What do the teachers think of the program? Are they enthusiastic about their work, or do they look upon it as so time-consuming and energy-draining that they are worn out at the end of each day? Do they begrudge the time spent in preparation? Or do they say, "Yes, it does take me longer to prepare for each day's activities, but it's worth it." Do the teachers understand that children's progress depends upon a number of factors, as pointed out by Slingerland (undated), some of which are: the severity or degree of the disability; intelligence; inner drive; background of educational values; the amount of special instruction received; and the time at which this instruction began (the more delayed the beginning, the more difficult it is to give adequate help in a classroom situation).

What of the children? Are they happy with what they are doing? Or are they bored? Do they have good feelings about themselves? If they are older children who have suffered failure, do they know that they are now able to succeed?

What of the parents? Do they like what is happening to their children? Are they relieved to know what specific language disability is, and how to deal with it? Are they enthusiastic about the program?

What of the administration, both at the school and at the district level? Do they know what is going on? Has the school board received feedback? What is the reaction here?

After the plan is evaluated, it should be updated and changed to correct any deficiencies that have developed during the previous period. Unless it is heartily disliked by all involved, a program plan for dyslexic children should never be dropped after only one trial period. Progress with dyslexic children may be slow, especially at first, so a plan should not be written off too hastily.

Maintaining Progress. There is no step in the implementation of any program more important than maintaining progress. Many programs, funded by large government grants, have begun with a burst of enthusiasm, have shown excellent progress the first year, but have not been able to maintain that momentum. Each year, there is less enthusiasm and less dedication. When the grant runs out, the plug is pulled on the program, and it trickles down the drain.

Maintaining progress does not happen on its own. After the initial shove, and the first spurt, there must be specific activities planned to maintain or to build on that beginning. These activities may be related to special opportunities for the teachers; meetings to involve parents in the school life and to acquaint them with what is happening to their children; inservice to advance the expertise of teachers and site administrators; reports by school personnel and parents to district administrators and to school board members; newspaper publicity; evaluation of data gathered; and the dissemination of these results, not only to local people but to the news media as well. Probably one person would need to be the key to see that initial progress is maintained.

Conclusion

In summary, the steps one might follow in establishing an educational plan for dyslexic children, within the framework of general education, are:

1. Identifying the problem.
2. Building a commitment to try to solve the problem.
3. Increasing awareness of the problem, self-awareness, as well as that of others.
4. Developing and implementing a plan of action to help the children.
5. Evaluating the implementation of the plan and revising it when necessary.
6. Maintaining progress.

Before even beginning to develop these six steps, there must be acceptance of the responsibility toward dyslexic children, right where they are—in the home, school, or community. We must cease our babble of excuses and passing of responsibility to others. If we care about people, if we weep inside at their pain, then we must *do* something about it, to the limits of our capabilities. We should be content with no less.

References

Behrman, P. 1975. Reading, 'riting, 'rithmetic and respect. *J. of Learning Disabilities* 8(9):22–23.

Cruikshank, W. 1978. Abstract of address. *ACLD Newsbriefs* July/August, p. 4.

Boder, E. 1973. Developmental dyslexia: a diagnostic approach based on three atypical reading-spelling patterns. *Develop. Med. and Child Neurol.* 15(5):663–687.

Barrett, C. 1965. Visual discrimination tasks as predictors of first grade reading achievement. *The Reading Teacher*. January. pp. 276–282.

Colarusso, R., Martin, H. and Hartung, J. 1975. Specific visual perceptual skills as long-term predictors of academic success. *J. of Learning Disabilities*. December, pp. 52–56.

Gillingham, A. and Stillman, B. 1966. *Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship*. Cambridge, Massachusetts: Educators Publishing Service, Inc.

Goins, J. 1958. *Visual Perceptual Abilities and Early Reading Progress*. Chicago: University of Chicago Press.

Orton, S. T. 1937. *Reading, Writing and Speech Problems in Children*. New York: W. W. Norton Company.

Slingerland, B. 1967, 1977. *Screening Tests for Identifying Children with Specific Language Disability*. Forms A, B, C, D. Cambridge, Massachusetts: Educators Publishing Service, Inc.

Slingerland, B. 1971. *A Multi-Sensory Approach to Language Arts for Specific Language Disability Children*. Cambridge, Massachusetts: Educators Publishing Service, Inc.

Slingerland, B. 1977. A Definition of Specific Language Disability. Mimeographed paper.

Slingerland, B. Undated. Points About SLD Children to Be Considered. Mimeographed paper.

First Grade Intervention for Reading Achievement of High Risk Children

John H. Litcher, Ph.D. and *Leonard P. Roberge, Ed.D.*

Wake Forest University
Winston-Salem, North Carolina

Introduction

In recent years the identification and remediation of learning disabilities in school-age children has been of prime concern to educators, parents and the public. Heightened public sensitivity to the educational problems of learning-disabled children has resulted in the use of various remediation strategies. The majority of these strategies involve special classrooms and teachers. The considerable expense involved in the adoption of most special programs for learning-disabled chidlren has raised an important and appropriate question in the minds of parents and educators: Do experimental programs for the remediation of children's learning disabilities result in greater gains in school-related achievement than the standard school curriculum?

The question of the effectiveness of a systematic remedial experimental program versus the standard curriculum became the focus of the High Risk Experimental Project, a three-year study (1975–1978), jointly sponsored by the Winston-Salem (North Carolina) Forsyth County Schools and the Junior League of Winston-Salem, and now completed.

A Three-Year Study

This paper is a report on the three-year study to compare the academic achievement resulting from two treatments of children identified as at risk for reading acquisition. Matched groups of first-grade children were placed either in special classrooms for special instruction (experimental groups) or in regular classrooms for regular instruction

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(control groups). For each of the three years, 20 experimental subjects were identified and placed in two intervention classes in two public schools in Winston-Salem, North Carolina. They were given reading instruction in small classes (10 pupils each) for three hours each morning using a structured, multisensory, phonetic approach taught by learning-disability specialists. Matched control groups were selected from the first-grade population of five other elementary schools in the Winston-Salem/Forsyth County school system and given standard reading instruction in regular classrooms.

To measure academic achievement of experimental and control groups, mean scores of both groups were compared on the Metropolitan Achievement Test and subtests of the Gates MacGinitie Reading Test. Statistical analysis of academic achievement of the experimental and control groups at the end of each first-grade year show significantly greater gains by the experimental subjects than by the control subjects.

Screening Procedures

A systematic screening procedure, summarized below, was employed to establish the experimental and control groups. This procedure was followed in each of the three years of the study.

Six hundred pupils were available for study for each of the three years. The subjects were drawn from two schools designated as Experimental Schools and five designated as Control Schools. Entering first graders in all seven schools were administered the *Metropolitan Readiness Test* (MRT).

The children who scored below the mean (established in a 1974 pilot study) on two out of three MRT subtests (word meaning, matching, copying) were retained in the control pool. This procedure reduced the Experimental and Control groups by half.

The *Slosson Intelligence Test* (SIT) was then administered to the remaining children to eliminate those whose current intellectual functioning was found to fall below the lower limit of the average range. Those who scored 90 or above on the SIT were subjected to additional screening.

The *Slingerland PSP* was administered to the remaining subjects to identify specific areas of learning difficulty. Subjects were retained if they scored at least one standard deviation below the mean on either visual, auditory or motor subtests. The subjects were also retained if they exhibited a Slosson mental age of at least six years two months, a maturational consideration based on normative data from the 1974 pilot study.

Routine visual and auditory screening eliminated several more subjects from the experiment.

Finally, remaining subjects in the experimental schools were administered the WISC-R to determine more accurately their global intellectual functioning. The WISC-R was administered to the students in the control schools in late spring.

Of the 30 or so remaining subjects in the experimental pool, 20 were retained according to a representative demographic cross-section on IQ, age, race and sex variable, and split into two groups of ten each in two schools. A control group of twenty subjects was selected and matched as closely as possible on all variables.

Method

Instruction for the experimental students consisted of a highly structured method of teaching the phonetic units in reading, based largely upon the sequence developed by J. L. Orton in *A Guide to Teaching Phonics* (1964). A multisensory approach was used to introduce and reinforce learning. Children used numerous teacher-made and commercial materials, and were not introduced to the state-adopted basal reading series until after the first of the year. The experimental students received the reading and language development instruction three hours per day for the entire school year. The control groups were taught by the standard methods used in the first grades of their respective schools, using the basal reading series.

Results

At the end of each academic year, the *Metropolitan Achievement Tests* (word knowledge, word analysis, reading and total reading subtests of the Primary I, Form F Test) and the *Gates MacGinitie Reading Test* (vocabulary and comprehension subtests of the Primary A, Form I Test) were administered to all pupils to assess their achievement in reading.

Subtest results were subjected to "*t*" tests of means to determine differences between experimental group and control group gain.

Significant differences were found at the conclusion of each year between the means (raw scores) for the control and experimental groups on all subtests of the *Gates-MacGinitie* and *Metropolitan Achievement Test*. The experimental group was significantly superior to the control group (Tables 1–6).

Raw scores were used to calculate the "*t*" for the 1976–77 and 1977–78 reports. Standard scores provide an alternative measure and were computed for the 1975–76 report. Standard score results were not calculated

Table I
Post-test Comparison of Means of MAT Subtests
1975-76

Group	*N*	*Word Knowledge*	*Word Analysis*	*Reading*	*Total*
Experimental $\bar{X}$	20	31.5 Raw 51 Standard 82 Percentile 2.5 Gr. Equiv.	36.3 Raw 45 Standard 84 Percentile 2.2 Gr. Equiv.	31.1 Raw 46 Standard 78 Percentile 2.1 Gr. Equiv.	62.26 Raw 46 Standard 78 Percentile 2.2 Gr. Equiv.
Control $\bar{X}$	20	26.5 Raw 43 Standard 58 percentile 1.9 Gr. Equiv.	29.65 Raw 39 Standard 58 percentile 1.9 Gr. Equiv.	25.05 Raw 43 Standard 68 percentile 1.9 Gr. Equiv.	51.55 43 Standard 66 percentile 2.0 Gr. Equiv.
Experimental SD		2.31	3.58	9.13	12.96
$t =$		2.314	3.57	2.04	2.36
$p =$		.025	.005	.05	.025
Control SD		5.80	5.86	6.77	11.99

Table II
Post-test Comparison of Means of Gates-MacGinitie Subtests
1975-76

Group	*N*	*Vocabulary*	*Comprehension*
Experimental $\bar{X}$	20	44.6 Raw 59 Standard 82 Percentile 3.0 Gr. Equiv.	27.55 Raw 57 Standard 76 Percentile 2.7 Gr. Equiv.
Control $\bar{X}$	20	35.25 Raw 48 Standard 42 Percentile 1.9 Gr. Equiv.	18.20 Raw 47 Standard 38 Percentile 1.7 Gr. Equiv.
Experimental SD		3.21	5.21
Control SD		7.53	6.72
$t =$		5.009	4.765
$p =$		.0005	.0005

Table III
Post-test Comparison of Means of MAT Subtests
1976-77

Group	*N*	*Word Knowledge*	*Word Analysis*	*Reading*	*Total*
Experimental $\bar{X}$	18	34.66 Raw 67 Standard 99 Percentile 4.1 Gr. Equiv.	37.7 Raw 49 Standard 90 Percentile 2.5 Gr. Equiv.	37.5 Raw 53 Standard 90 Percentile 2.7 Gr. Equiv.	72.2 Raw 55 Standard 94 Percentile 2.9 Gr. Equiv.
Control $\bar{X}$	18	28.22 Raw 45 Standard 66 Percentile 2.0 Gr. Equiv.	30.3 Raw 39 Standard 58 Percentile 1.9 Gr. Equiv.	27.3 Raw 44 Standard 70 Percentile 1.9 Gr. Equiv.	55.5 Raw 44 Standard 70 Percentile 2.1 Gr. Equiv.
Experimental SD		.47	2.22	4.5	4.66
$t =$		4.99	4.87	4.808	5.395
$p =$		.0005	.0005	.0005	.0005
Control SD		5.07	6.34	9.4	13.1

Table IV
Post-test Comparison of Means of Gates-MacGinitie Subtests
1976-77

Group	*N*	*Vocabulary*	*Comprehension*
Experimental $\bar{X}$	18	46.3 Raw 63 Standard 90 Percentile 3.2 Gr. Equiv.	31.0 Raw 61 Standard 86 Percentile 3.2 Gr. Equiv.
Control $\bar{X}$	18	38.8 Raw 52 Standard 58 Percentile 2.3 Gr. Equiv.	23.0 Raw 53 Standard 62 Percentile 2.1 Gr. Equiv.
Experimental SD		1.8	1.97
Control SD		7.6	7.37
$t =$		3.721	4.46
$p =$		.005	.0005

for the 1976–77 and 1977–78 reports. The .10 level of significance was selected for use in the present study.

Limitations of the Study

These limitations appear to be inherent in the study:

1. Variables associated with the experimental teachers, other than a working knowledge of the selected technique, could have influenced the results of the study.
2. The present study does not attempt to compare the experimental method of instruction with other teaching methods which may be equally effective.
3. Methodologically, it would seem proper to question the rather rough and arbitrary fashion in which certain screening instruments were employed. For example, initial selection of subjects (pre-testing) was based on demonstrated difficulty in *either* the visual, auditory, or motor area. A more specific subject selection procedure would allow for a more thorough assessment of gains by pupils in specific learning areas.
4. The strategy employed in the matching of experimental and control pupils must be examined in light of the instruments used for the assessment of general intellectual ability. Some potential subjects were excluded from the present study because of a disparity between Slosson and WISC-R IQ scores. While the results of some previous research have indicated a high positive correlation between the WISC-R and the Stanford-Binet, that strong relationship was not found to be true in the present study which employed the Binet-based Slosson as a rough screening device. A more conceptually consistent approach would seem to dictate the employment of the Stanford-Binet as a global measure of intelligence rather than the WISC-R.

Conclusion

Limitations notwithstanding, it would appear that the present study has considerable value in that it does employ "hard" achievement-related data to determine the effectiveness of a particular teaching strategy as it

Table V
Post-test Comparison of Means of MAT Subtests
1977-78

Group	*N*	*Word Knowledge*	*Word Analysis*	*Reading*	*Total*
Experimental $\bar{X}$	18	33.9 Raw 57 Standard 90 Percentile 3.0 Gr. Equiv.	38.3 Raw 49 Standard 90 Percentile 2.5 Gr. Equiv.	38.8 Raw 53 Standard 90 Percentile 2.7 Gr. Equiv.	72.8 Raw 53 Standard 92 Percentile 2.7 Gr. Equiv.
Control $\bar{X}$	18	25.8 Raw 43 Standard 58 Percentile 1.9 Gr. Equiv.	27.6 Raw 38 Standard 54 Percentile 1.8 Gr. Equiv.	21.3 Raw 41 Standard 56 Percentile 1.8 Gr. Equiv.	47.2 Raw 41 Standard 56 Percentile 1.9 Gr. Equiv.
Experimental SD		1.3	1.9	2.9	3.9
t =		5.25	9.13	7.63	7.18
p =		.001	.001	.001	.001
Control SD		6.4	4.9	10.4	15.8

Table VI
Post-test Comparison of Means of Gates-MacGinitie Subtests
1977-78

Group	*N*	*Vocabulary*	*Comprehension*
Experimental $\bar{X}$	18	46.1 Raw 63 Standard 90 Percentile 3.2 Gr. Equiv.	31.1 Raw 61 Standard 86 Percentile 3.2 Gr. Equiv.
Control $\bar{X}$	18	34.4 Raw 47 Standard 38 Percentile 1.8 Gr. Equiv.	18.8 Raw 47 Standard 38 Percentile 1.7 Gr. Equiv.
Experimental SD		1.7	3.5
Control SD		8.9	7.9
t =		5.69	6.48
p =		.001	.001

relates to high-risk pupils. The study appears to indicate an affirmative response to the question referred to earlier: Are experimental programs for the remediation of learning disabilities more effective than standard school curricula in helping pupils gain in school-related achievement? In this instance, class size and methodology were effective. Moreover, a beginning emphasis on phonetic units with multisensory integration resulted in pupils learning to read at a significantly higher level in the experimental group of at-risk children than in the control group.

The School Principal as Advocate for the Child with Learning Differences

William Ellis

Director, Middle School
Friends School of Baltimore, Inc.
Baltimore, Maryland

As a fledgling administrator in a private college preparatory school, several years ago, I was bewildered when I found students there who seemed to be very bright but unable to demonstrate their ability in ways which one would normally expect. I expecially remember the boy who could hold a social studies class spellbound with his anecdotal knowledge but who could not write on paper coherently. This boy, incidentally, is now a sophomore at an excellent midwestern college. Similar experiences have caused me to consider the role the school principal should play in developing an encouraging school climate for such children. Programs, without appropriate and humane attitudes, cannot be truly successful. It is in this aspect that the principal can make a contribution and, I have come to believe, should make the effort to do so.

When we make adjustments for children with academic difficulties, teachers in schools such as mine worry about the decline of standards, the reputation of the school in the community, and the problem of dealing equably with all students. In other words, if programs have to be modified, if we are admitting students with learning disabilities, if we are making adjustments for a few, will we not be seen as denigrators of traditional standards—a school for problem children and unfair in our dealings with the majority of the students? For example, a teacher who establishes a criterion for meeting deadlines (perhaps reducing a grade when work is not handed in on time) will have difficulty in justifying a different standard for a few students. The principal who supports the rights of individual learners in such situations will assume a role of paramount importance, one that

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will transcend the functions normally perceived to be those of the principal.

A study conducted for the National Association of Secondary School Principals in 1965 revealed that principals spent most of their time in planning alone or with subordinates, in meetings with individual teachers or groups of teachers and, only fourth in the list, with students. Their meetings with students were invariably on disciplinary matters (Jacobson et al. 1973, p. 135). The unfortunate implication of this is that principals see their role as only indirectly having impact on students except where discipline is concerned. Yet, surely the primary responsibility of the principal is to see that all children in the school are learning.

Without the support of the principal, the child who exhibits differences in learning will have a difficult path to follow. He will encounter censure at every turn because in many ways he will be unable to conform to normal school routines and regulations. For him special provisions have to be made, but schools in general are remarkably unwilling to practice the message of individuality which they preach.

The principal, therefore, must undertake the role of the main child advocate in the school, and this is what I have attempted to do over the years. The principal has to find a balance in the concern for all the constituents of his school. Students should have time at least equal to that given to the teacher, the ordering of materials, the development of curriculum, and all the other matters that come before him. What the principal sees as his most significant role establishes his priority.

I have made it my responsibility to keep in touch with students who are having learning difficulties. I have tried to persuade them to signal me, either personally or through a friend or parent, if they are having difficulties as, for example, keeping up with their work load. A child, particularly in the early adolescent phase, will sometimes find it difficult to go from teacher to teacher requesting help. Also many students will prefer not to go directly to the principal's office since they do not wish to face the explanations they will inevitably have to give to their peers who will want to know why they were there.

When the student signals for help it is usually because he feels that he is far behind in a number of areas or that he is feeling overwhelmed. In such cases, the principal can help the child define clearly what work is incomplete, what deadlines have to be met, and what is the more significant material to be attempted. Together, the principal and the student can establish a schedule utilizing release time, as well as reasonable time at home, to accomplish what must be done. The principal then clears it with the teacher. With such a simple gesture, the principal accomplishes the following:

1. He has affirmed for the student that the school cares about him.
2. The solution carries the weight of the school behind it.
3. The teacher tends to accept the solution without harassment of the child.
4. The principal and the teacher have engaged in mutual education about the needs of a student.

Such an approach does not reduce the standards of the school. The student is still held repsonsible for the best quality work possible. The modification involved is minimal, attacking his problem with organization, in this case, but upholding his responsibility to perform as well as possible. Often, teachers and administrators, are rigid in their demands that students meet deadlines but frequently rationalize their own procrastination in this regard. The function of the principal is to make a potential for success out of what is a reality of the child's life. Schools sometimes seem to lead such children to failure. I would rather work for success.

The clear support of the principal for the student will enhance the cause of the student as the focus of the school's attention. However, the principal cannot manage the process alone. He must find ways to involve his teachers in some of the important decision-making as it relates to such children. For several years, the schedule in our school has permitted three weekly faculty meetings, during the school day, at which perceptions and concerns about given students can be shared. Two purposes are served:

1. Teachers can help each other in mutual understanding of a child's needs. Those who are more closely attuned to the child whose learning patterns are different can assist the others in understanding what is happening and what can be done to help.
2. The frustrations, which teachers of such children inevitably manifest, can be vented in a safe, non-destructive atmosphere. The principal in his role as the advocate of the child has an excellent opportunity in such sessions to make the case for support for these students as well as tempering the easy dismissal of the learning-disabled.

Schools which encourage faculty involvement in decision making will find such sessions helpful but not necessarily easy. The child will benefit, however, from the formal outlet for teachers which such an approach provides. It is the aim of such sessions to find helpful outcomes for the child.

Additionally, these meetings help the teachers to concentrate on their responsibility to the child whose learning does not always readily fit the mode of the typical college preparatory or, for that matter, any traditional classroom. Many schools, such as mine, now have reading specialists or even remedial programs. While such efforts are to be applauded, it is regrettable that the classroom teacher is thus provided with an easy way out of responsibility. The faculty meetings I have described often result in recommendations that tutors take on the teaching role. Such recommendations are invariably realistic but teachers tend then to absolve themselves of responsibility for the student. Often they do so because they are afraid to tackle what they perceive to be enormous modifications.

In fact, the nurturing of careful attitudes among teachers by the principal, through these frequent talk periods, will enable teachers to see that modifications can be quite minimal and certainly manageable by the classroom teacher. In my school, agreement has been reached that the following approaches can be helpful to all students and have particular meaning for the child suffering from language or mathematics difficulties.

1. A standardized format for note files to assist in organization. The students are shown how to set up the notebook and even the order in which materials should be maintained.
2. A manageable set of correction symbols to which all teachers can adhere and which the students can understand.
3. A realistic attitude towards the meeting of deadlines and timing of tests. It is not a lowering of standards to work these out realistically for all students, and for some it is very important that they show what they can accomplish without the pressure of the clock.
4. The permission to use tape recorders and calculators. Some students, however, are uncomfortable walking around with a tape recorder, especially in Middle School. In one such case the teacher keeps the recorder and turns it on during appropriate lessons. The student then has a useful reference for future use.
5. Oral testing. While oral testing is not possible all of the time, given occasionally it can enable some students to shine in a way that is not always possible in written work.
6. Clear use of the chalkboard by the teacher This visual tool, used so frequently by teachers, is often poorly utilized. Teachers are

urged to use clear, legible writing; to arrange material in an orderly, logical sequence; and to indicate to students what is worth copying down for future reference. Effective use of the chalkboard is an item which appears in our teacher evaluation instrument.

7. Following a consistent sequence in all lessons. This permits a sense of security for the child. A brief reveiw and a summary are imperative.

These and other procedures have been accepted as norms through our process of continual discussion. In the broadest sense, such approaches help to create an environment in which the learning-disabled child can be comfortable. The principal has an obligation to see that all the teachers in the school assume this degree of responsibility. Whatever other assistance is required and provided for the child—remedial tutoring, for example—will be greatly enhanced by these attitudes, none of which is outside the grasp of any teacher, so that we can and do improve the climate for those who have to contend with learning deficits.

Perhaps the most important of all services which the principal can perform is to the parents of the child with learning disabilities. Particularly in the middle school years, parents experience many anxieties and often a large degree of guilt. For such parents, the experience with schools has amounted to barriers to learning rather than enhancers of learning. The perceptive principal will accept the fact that children with learning difficulties will come to school equipped with their parents and their related difficulties.

Parents of children with learning difficulties rarely find an outlet for their frustrations. What efforts have been made to deal with the learning problems usually have been directed to the child. However, the parent who has no outlet for expressing his frustrations will become a counter-productive influence for the child who is already troubled. More than most, these children need, in a very real sense, all the affirmation it is possible to give them. Frustrated, anguished parents will find it very difficult to affirm anything and, perhaps, their greatest need is to be affirmed themselves in the way that we want them to support their own child.

The principal can make it clear that if anyone is to be berated it is he. His office can be put at the disposal of such parents who can be given the privilege of coming when frustration is at its highest point. I am not advocating that the principal should assume the role of psychiatrist—few are trained for that. However, in the long run, the principal is the only person in the school who can effect the changes necessary for that child to survive in school. Parents, above all else, want to believe that their child will have a happy, productive life, and the principal can help them to retain their perspective and hold on to their faith. Their anguish is diminished by a receptive, authoritative ear. The energy of the parents needs to be positively directed towards affirmative support of their child. The principal can be a considerable support for the parent and he can provide an important service to the child and the parent.

School prinicipals often feel beleaguered by the multitude of pressures which they encounter in their daily tasks. Urging them to tackle this additional obligation is, therefore, not done lightly. However, all principals learn to recognize that in the performance of their duties they must, almost daily, order their priorities. For me, as a principal, there is no more worthy candidate for the first ordering of priorities in a school than the child. The principal can and should be the most potent force for good in the school life of the learning-disabled child.

Reference

Jacobson, P.B., Logsdon, J.D. and Wiegman, R. R. 1973. *The Principalship: New Perspectives.* Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Supplementary English for Specific Language Disabilities: Two Independent School Approaches

Elizabeth A. K. Dailey

Milton Academy
Milton, Massachusetts

Eleanor Thurston Hall

Buckingham Browne and Nichols School
Cambridge, Massachusetts

Many of the independent, college-preparatory schools, especially in the eastern part of the United States, now respond to the needs of capable students who have specific language learning problems. Graduates of such pioneer teacher-training centers as the Massachusetts General Hospital Language Clinic and The Children's Hospital Adolescent Unit are teaching and developing programs in many of New England's private as well as public schools. This paper will describe the programs developed at two independent schools, Milton Academy and the Buckingham Browne and Nichols School.

The Program at the Milton Academy

For the past decade it has become more and more apparent that the ability of students to read and write accurately has declined. One can read an article almost weekly in a newspaper or magazine on why Johnny can't read or write. More and more literature is published on the subject; more and more "bonehead" English courses are required at the college freshman level. Some schools use special reading consultant services for periods of three or four weeks for programs in developmental reading and/or writing. At Milton Academy, however, we have developed a program which offers help at each class level and gear it to meet the needs of individual students.

Milton Academy Upper School this year has a total enrollment of 694 students—277 girls and 417 boys. It runs from grade 7 through 12. The

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The section of this paper that describes the program at the Buckingham Browne and Nichols School is adapted from a presentation by Mrs. Hall at the 29th Annual Conference of The Orton Society, November 1978.

school does not accept boarding students until the 9th grade, and the greatest influx occurs at the 10th grade level. Of the total enrollment, approximately 25 percent of the students are enrolled in a reading or language skills course of some sort. No matter how capable the student or how well trained, reading is a skill which we believe must be nurtured and geared to the student's level of maturity. More subtle and sophisticated levels of reading comprehension must be acquired as a student proceeds through the high school years.

Middle School Grades

Curriculum. Several years ago we decided that the common assumption that students no longer required a reading and writing course at the 7th grade level was erroneous. Therefore, we instituted a course for all students at that level to be taken in addition to the regular English course. We have developed our own curriculum for this course. It includes the close analytical reading of a book on Britain in the Middle Ages which lends itself to the development of sound comprehension skills. We stress the identification of main ideas and supporting evidence, cause-effect or comparison-contrast relationships, the finding of important information and the ability to discriminate between the relevant and the irrelevant. These assignments lead into the writing of clear complete sentences, the taking of notes, outlining, and coherent paragraph development. The work progresses from relatively detailed instructions and simple demands to fairly complicated longer reading and writing assignments with more general and broad instruction. In conjunction with the use of this text, we read one historical novel of the same period and emphasize the writing of logical sequential synopses. We also work on vocabulary development both in context and from an etymological approach.

Evaluation. In order to plan for any student who may be dyslexic or may have other special needs, we have an "Orientation Day" in the spring preceding the student's enrollment. All students who have been accepted into either the 7th or 8th grades are invited, along with their parents, to attend a session on a Saturday morning. This allows us to explain our program to the parents. Since the students have already been accepted, this procedure does not pose a threat, and they actually seem to enjoy getting together.

At this time, we administer to all the students a phonics proficiency test of our own invention, a Lincoln Diagnostic Intermediate spelling test, and the Pimsleur Test for Aptitude in a Foreign Language. The results of these tests, plus the information which has already accumulated in the student's folder, enable us to plan the student's schedule carefully. For example, the Pimsleur is of some help in deciding which foreign language a student might be wise to select. For the bright but severely dyslexic student, we usually recommend a private tutoring course using the Orton-Gillingham techniques rather than starting a foreign language at this time.

At the end of the 7th grade year, we are well aware of the individual needs of each student and are able to plan the appropriate section for him or her in the 8th grade. A few students have progressed so rapidly that they do not enroll in any reading course, but the majority can profit from further training and reinforcement. In addition, any student entering the school at this level is enrolled in one of the sections which is planned according to the specific needs of the student.

Methodology. The sections are small and allow for individual attention. Much of the Orton-Gillingham training is included in the curriculum at this level in those sections where we have students with mild to moderately severe language disabilities. The broad curriculum is again designed by members of the department first, to offer interesting and constructive content to the course and second, to aid the non-verbal or dyslexic student in developing the tools he will need for the demanding curriculum during his last four years at Milton Academy. Occasionally at this level, a student who continues to be struggling with his own language will again postpone starting the study of a foreign language and continue with private or very small group tutoring. We have found that even the most able and non-dyslexic student can profit from a demanding and rigorous course which reinforces and supplements the fundamentals presented in the 7th grade. The dyslexic student has one more full academic year to develop his skills.

Upper School Tutorials and Small Groups

In both the 7th and 8th grades, the courses in Reading and Writing are considered part of a student's regular academic program. From the 9th grade on, the courses are regarded as tutorial in the sense that the number of students per class is limited, and the school charges a small fee in order to subsidize the program. One great advantage which we can give the student is to offer this course for academic credit. A course in Language Skills does not have any stigma attached to it, and it does not burden the student with a heavier load because he needs the special help. Also, a student's enrollment in the course is predicated on his wish to be in it. We do not require students to take the course, and if they are resistant, we prefer that they do not.

We have several methods of helping us to identify and properly section students in the upper grades. The standardized tests which we regularly administer from the ninth grade on to all students include the Cooperative English, the SCAT, and often the Lincoln Diagnostic. We also rely heavily on the WISC or WAIS and the Gray's Oral for diagnostic purposes. Faculty referrals are also frequent and very important. We do knowingly admit dyslexic students to Milton Academy, but only after careful evaluation and program planning. We have worked with students at Milton who have Full Scale IQ scores (based on the WISC) which fall in the Very Superior range. It should be noted, however, that if a student has a somewhat limited ability, albeit in the national range of average, and a severe language disability, he will face almost insurmountable academic difficulties at Milton. Most of the students in the upper grades with whom we work have WISC scores which fall somewhere between the two extremes mentioned above.

This year we are running two full sections of Language Skills in the 9th grade, four in the 10th grade, and one in the 11th grade. In addition, seven sections of the so-called half course are scheduled in the 11th and 12th grades. Most of the students in these courses are new to the school or are those who were not identified until after their arrival at the school so that they had not had the benefit of the 7th or 8th grade programs.

Content of Courses at Different Levels. All these students require some basic training in the structure of the language. This training includes a study of basic phonetics, the rules for syllable division, and the basic spelling rules and generalizations. This work also necessarily involves some intensive work in grammar and syntax, and here we try to work closely with the English department.

All of the courses at these upper levels attempt to develop competent reading skills in all areas. Sophisticated reading for the college-bound student is actually a complex process. We try to show the student that there are different levels or categories of comprehension, and that he must become proficient in identifying these levels. Just to mention a few important factors in becoming a skillful reader: a student must learn to identify different types of paragraph development; he must learn to note important signal or pointer words such as *since, but, moreover.* He must also develop the ability to find significant supporting evidence and to draw sound inferences or conclusions. He must be able to understand figurative language and symbolism, and to perceive the author's tone and purpose. A broad and usable vocabulary is another essential for a student to be successful in all areas of comprehension. We work regularly in vocabulary development.

The kinds of material which we use vary with the deliberate purpose on our part of showing the students that different types of reading require different approaches, different skills, and different rates of reading. For example, we discuss how to approach the reading of a chapter in a science or history textbook where previewing and questioning are so important before the actual perusal. We try to develop the sorts of reading and writing skills which are essential for success both at Milton Academy and in college. We do work in outlining, note-taking, listening to taped lectures with subsequent testing. We also emphasize the importance of clear coherent expository writing— be it a precis of a difficult assignment or a longer written assignment based on the reading. (For a partial list of materials used in the program at Milton Academy, see Appendix A.)

Conclusion. Milton Academy cannot serve the needs of the severely dyslexic student who requires specialized schooling. But through the years, we have been successful in helping many students to cope with their language problems, to go on to reputable colleges, and to maintain competent performance. One of the positive and constructive roles which an independent school can perform today is to offer a high quality of training in this field as part of its special contribution in education. The trustees of the school, the administration, and the faculty deserve a great deal of credit in giving this rather special program their full support.

The Program at Buckingham Browne and Nichols

At Buckingham Browne and Nichols School in Cambridge, Massachusetts, one of the largest co-educational college-preparatory day schools in the East, with a K–12 enrollment of 900 students, concern started in the 1950's for helping a small number of high-potential, language-disabled Browne and Nichols boys.

By 1977–78, after a 1974 merger with the Buckingham School, 22 boys and girls, or almost one-fourth of the graduating class, had had language training on a one-to-one or small group basis once, twice, or three times a week: twelve for one year, eight for two to three years, two for five years. The 1976–77 graduating class of 108 included 25 college-bound boys and girls who had had from one to four years of help: sixteen for one year, seven for two to three years, two for four years.

Instruction for these students has been based on the rationale that learning can be facilitated for some English language-disabled students through the flexible use of an integrated auditory, visual, and kinesthetic process. Language improvement includes: reading with better rate and comprehension; organizing ideas; mastering vocabulary; and writing with correct sentence structure and spelling.

Curriculum Overview

In the Lower School, individual or small group tutorial help is offered by a staff of trained specialists to children with special needs. The Middle School offers Supplementary English for credit four times a week, in lieu of Latin or French, to 7th and 8th graders who need to improve basic language skills. Oral reading is aided by sound analysis of syllables, and vocabulary is studied to facilitate silent reading with comprehension. Grammar, sentence structure, and paragraph writing are taught. Outlining helps to analyze reading content and to structure written ideas. In the Upper School, ninth grade students who need extra help with basic reading and writing skills enroll in Developmental English. The work in this course is similar to the curriculum described above, but with more emphasis on spelling, grammar, punctuation, outlining, and reading comprehension.

In addition to the Developmental English course, there are some ninth graders who need help two or three times a week from the Upper School language specialists. Students in the 9–12 Supplementary English Upper School tutorial program average about 20 per year; the Middle School average is 27. Overall, about 10 percent of the total student body at Buckingham Browne and Nichols receives some extra help.

Evaluation and Sectioning. Now in its fifth year, Middle School Supplementary English includes two sections of eighth graders, and one or two seventh grade sections. Students work in groups of six to ten, four times a week, in addition to their regular English classes. In addition, small groups of students who need more supportive work in spelling, writing, and reading/comprehension receive instruction once a week.

Sixth graders from the Lower School are included in Supplementary English through consultations of sixth and seventh grade administrators, English teachers, the Lower School special-needs tutors, and myself. Admission and placement of new students in Supplementary English is determined by careful consideration of information in admission folders concerning previous grades; the reports of administrators, teachers, or tutors; results of achievement and ability tests; and clinical diagnosis, if available. When indicated by the assembled information, students are asked to come in to work with me to assess their oral and silent reading, comprehension, knowledge of vocabulary, and writing and spelling abilities. During the year, referrals from teachers or advisers are carefully considered by all concerned, through looking up background information, discussing classroom performance, comparing grades in reading content subjects with verbal scores on the fall school-wide Comprehensive Testing Program from the Educational Records Bureau of Princeton, New Jersey, and through some diagnostic work with me. A similar evaluative process is used in the Upper School when building in extra tutorial or small group work for 9–12 students.

Each fall, Supplementary English students are assessed for placement in their language work. What are the individual differences within the group which will need to be considered in lesson planning? What do the students know? What do they need? Diagnostic teaching begins from the start. We read orally so that mechanical errors can be picked up, recorded, and corrected, and use the Stanford Diagnostic Reading Test to find out in which stanine or percentile each student falls for his or her grade level. We use a 50-word Stanford Spelling Test to assess visual memory; dictate sentences to look at handwriting, spacing, and proofreading ability; try out grammar terms to find out what exposure has been given or retained; and obtain an initial writing sample to find out what comes through during a class writing exercise where the work must be one's own—not with peer or parent help. We find a wide range of language ability even within a group of 10 students. For example, in one such current group, two students are from a nearby special school for dyslexics where they have been up until seventh grade; one girl, with diagnosed language disability as early as second grade, is from a public school; and a boy from a nearby private school is bilingual in Spanish and English and has verb tense and spelling problems. Good intelligence is evident in these students. Reading may go quite well and writing or spelling be the problem, or the reverse may be the case.

Methodology. We use regular 7th and 8th grade texts for reading, writing, and grammar, but the structured language basis for word analysis, spelling, and affix work is derived from the teacher's manual, *Remedial Training for Children with Specific Disability in Reading, Spelling, and Penmanship*, by Anna Gillingham and Bessie W. Stillman. The manual contains a wealth of detail for teaching sound and spelling variations of vowels and consonants; for awareness of the importance of content when a sound may be spelled various ways, such as */past/* for *past* and *passed; /prīd/*

for *pride* and *pried;* or */sīz/* for *size* and *sighs;* for accent changes for words such as *operation* and *operative;* and for the six kinds of syllables and related syllable division in words.

By seventh and eighth grades, students know more or less about such language structure depending upon how they were taught. Early diagnostic teaching can sort out what is known or needed. Additional awareness of syllables may be implemented by syllable dictation—after writing separate syllables, students take turns reading each whole word. Then, by transferring syllables to the six categories, concrete evidence shows how words are constructed. Another syllable variation which proves to be very creative for students who have difficulty with sentence structure is cinquain writing, a five line poem where the title has two syllables, the second line of description four syllables, a third line of action six syllables, a fourth line of eight syllables with feeling words, and a two-syllable conclusion. Students discover that different combinations of words produce syllable variations.

When reading a story for the general overview, students are asked to underline names of characters and put a *c* in the margin. Any vocabulary words which they cannot pronounce or understand are also underlined, with a *v* in the margin. In class, these words are studied for syllable division, word-attack skills, and comprehension. Vocabulary words may be used in oral or written sentences. Then, a return to the text with a rereading of the sections where the words have been discussed provides better reading rate and comprehension.

A student-made Spelling Skillbook provides not only an aid to reading but also the foundation for 7th grade writing. While we are using *Warriner's Composition: Models and Exercises 7* to read about and review nouns, verbs, adjectives, and adverbs, the progression in the structured Spelling Skillbook develops like this:

				Part of Speech
1-1-1 base word	+	*-s*	suffix	n/v use
add digraphs	+	*-es*	suffix	n/v use
add blends	+	*-ing*	suffix	v/adj. use
v-c + *e*	+	-(e)d	suffix	v/adj. use
other syll.	+	-ly	suffix	adj/adv. use

The sequence continues into more advanced syllable, base word, and affix word, and carries over to dictations requiring thoughtful interpretation of grammar concepts. Poor auditory and visual memory must rely on the use of more sophisticated spelling rules and generalizations. Reading, writing, and spelling all require both inductive and deductive reasoning. For example, recognizing and extracting rule words and generalizations from paragraph content and then constructing one's own writing with some of these same words gives a creative aspect to necessary repetition and provides a drill variation.

Supplementary English classes, both 7 and 8, work all year on how to find basic ideas in context, how to organize, how to do homework, how to underline and mark content, how to follow directions, how to listen, how to review for and take a test, how to summarize, how to master vocabulary, and, one hopes, how to enjoy the English language.

One of our supplementary English texts for the eighth grade is *Basic Verbal Skills for the Middle School* by Burnham and Lederer of St. Paul's School, Concord, New Hampshire. The authors approach the fundamentals "not as ends in themselves but as a course from which direct applications are made to the challenges of sentences, paragraphs, and composition improvements." Here we identify definitions, extract and organize areas of content, learn ways of improving sentences, do oral and written compositions, and transfer, as in the 7th grade, our grammar skills to a carefully structured Spelling Skillbook.

Word lists start with prefixes + base words or roots + suffixes. By the time we have worked through *a-*, *ab-*, and are learning the nine *ad-* changes for euphony, a homework lesson for dictionary use might begin like this:

Prefix change + base word	Original pref. + Latin root	Meaning of Latin root
af fect	*ad + facere*	to do
af fix	*ad + figere*	to fasten
af firm	*ad + firmare*	to make firm

Later, when all the prefix changes have been learned for *ad-*, and much practice has been given along the way, final dictated sentences can be constructed by the teacher, or created by students and labeled, according to what has been taught.

The following is an example of how a student would respond to a dictation.

The radio *an*nouncer *at*tempted to change the *ar*rangements made
n/sub. *past v. sim. pred.* *pl. n. obj.. of inf.*

by his *as*sistant, but *app*arently it was impossible.
n/ojb. of prep. *adv.*

Our *Basic Verbal* text encourages oral composition, which becomes an auditory and kinesthetic reinforcement for written work. Also, we make grammar application to paragraphs from the short story reading to learn how the skills we are studying and practicing become the easily available tools of an author.

Tutorials and Small Groups. At the Upper School where I coordinate, sometimes teach, and schedule the one-to-one tutoring and/or small-group language training, two specialists work with some students who have had supplementary English in grades seven and/or eight and, although in Developmental English, still need additional help. The specialists also work with any new 9th graders who need improvement in reading with comprehension, or with writing/spelling skills or study skills. Each specialist keeps in touch with teachers and advisors, reinforces study skills when needed, and provides a steady source of structured language help related to specific needs.

A typical tutoring session might include working on pronunciation, work attack, parts of speech, and prefix-root-suffix meanings. Such strategy may be leading to better reading with comprehension, or structuring an essay, or looking ahead to the SAT's, or mastering a spelling difficulty. Motivation is not usually a problem in this private school setting. Students want to improve and move on. It is a challenge for the specialist to find materials to use with students who have a slow reading rate, poor comprehension skills, vocabulary lacks, and inadequate writing skills. (See Appendix B for listing of additional materials used in the Buckingham Browne and Nichols School program.)

Conclusion. Continuous evaluation is the key to a successful program. We have surveys of how many of the special students make it through to graduation, how many can be phased out of the language training program after one, two, three, or four years. We know there are a few who cannot finish in our academic climate and we find alternate routes for them. In most cases, developing ability to do what was previously very difficult is enough to heighten self-image, supply continuing motivation, and produce better results. The school goal, which parents share, is individual progress with gains in skills which enable full use of personal and academic potential.

Appendix A

The following is a partial list of the materials used by the Language Skills Department at Milton Academy. The materials used vary from year to year as the students' needs and interests vary. Clearly, all of the materials are not used in every group. Instead, some are selected for the special needs of a section. The *way* in which a specific material is used is as important as the material itself.

Brown, J. 1959. *Explorations in College Reading.* Englewood, New Jersey: D. C. Heath Co.

Brown, J. 1971. *Programmed Vocabulary.* New York: Meredith Publishing Co.

Casty, A. 1972. *The Act of Writing and Reading.* Englewood Cliffs, New Jersey: Prentice-Hall.

Casty, A. et al. 1974. *Staircase to Writing and Reading.* Englewood Cliffs, New Jersey: Prentice-Hall.

Diederick, P. et al. 1973. *Vocabulary for College A.* New York: Harcourt Brace Jovanovich.

Ervin, J. 1972. *Reading Comprehension, 7–10.* Cambridge, Massachusetts: Educators Publishing Service.

Hodkinson, K. 1971. *Worldly Wise, 5–9.* Cambridge, Massachusetts: Educators Publishing Service.

Joffe, I. 1975. *Opportunity for Skillful Reading.* Belmont, California: Wadsworth Publishing Co.

Langan, J. 1977. *English Skills.* New York: McGraw-Hill.

Leahy, W. 1966. *Fundamentals of Grammar.* (Text and Workbook). Palos Heights, Illinois: Kenneth Publishing Co.

McCall, W. and Smith, E. 1964. *Test Lessons in Reading/Reasoning.* New York: Teachers College Press, Columbia University.

Orgel, J. 1976. *Aptitude Tests for Reading Comprehension.* Cambridge, Massachusetts: Educators Publishing Service.

Orgel, J. 1978. *College Entrance Reviews in English Aptitude.* Cambridge, Massachusetts: Educators Publishing Service.

Pauk, W. 1975. *A Skill at a Time Series.* Providence, Rhode Island: Jamestown Publishers.

Pauk, W. 1970. *How to Read Factual Literature.* Chicago: Science Research Associates.

Sack, A. and Yourman, J. 1970. *100 Passages to Develop Reading Comprehension.* New York: College Skills Center.

Sack, A. and Yourman, J. 1971. *Lecture Listening and Note Taking.* New York: College Skills Center.

Schumacher, M. et al. 1969. *Design for Good Reading.* Books A, B, C, D. New York: Harcourt Brace.

Thurstone, G. 1969. *Reading for Understanding.* Chicago: Science Research Associates.

Warriner, J. E., et al. 1973. *English Workshop.* New York: Harcourt Brace and Jovanovich.

Warriner, J. E. et al. 1973, 1978. *English Grammar and Composition.* New York: Harcourt Brace and Jovanovich.

Welsh, M. M. et al. 1973. *Reading and Writing Workshop.* Books A, B, C, D. New York: Harcourt Brace and Jovanovich.

Appendix B

The following is a list of materials used in the Buckingham, Browne and Nichols School program.

Burnham, P. and Lederer, R. 1976. *Basic Verbal Skills For The Middle School*, Text and Workbook. Wellesley Hills, Massachusetts: Independent School Press.

Culliton, T. E. and Ross, E. A. 1971. *Thirty Lessons in Outlining* (Advanced). Woburn, Massachusetts: Curriculum Associates.

Ervin, J. 1972. *Reading Comprehension 7–9*. Cambridge, Massachusetts: Educators Publishing Service.

Fry, E. B. 1975. *Reading Drills*. Providence, Rhode Island: Jamestown Publishers.

Gilbert, D. W. 1972. *Breaking The Word Barrier*, Englewood Cliffs, New Jersey: Prentice-Hall.

Gillingham, A. and Stillman, B. W. 1960. *Remedial Training For Children With Specific Disability In Reading, Spelling, And Penmanship*. Cambridge, Massachusetts: Educators Publishing Service.

Hall, E. T. 1975. *Learning The English Language, Skill Book II*. Cambridge, Massachusetts: Educators Publishing Service.

Hodkinson, K. 1971. *Wordly Wise 4–9*. Cambridge, Massachusetts: Educators Publishing Service.

Leahy, S. 1973. *Fundamentals of Grammar*. Palos Heights, Illinois: Kenneth Publishing Company.

Lehmann, P. W. 1960. *The Junior Precis Practice Pad*. Dublin, New Hampshire: Educational Publications.

Levin, H. 1972. *Vocabulary For The High School Student*. New York: Amsco School Publications.

Miller, W. S. 1967. *Word Wealth*. New York: Holt, Rinehart & Winston.

Niles, O. S., Bracken, D. K., et al. 1965. *Tactics In Reading, I & II*. Glenview, Illinois: Scott, Foresman.

Orgel, J. R. 1974. *Spelling: Handbook of English, Reference and Study Guide*. Cambridge, Massachusetts: Educators Publishing Service.

Orgel, J. R. 1976. *Aptitude Tests In Reading For College Entrance*. Cambridge, Massachusetts: Educators Publishing Service.

Orgel, J. R. 1977. *College Entrance Review In English Aptitude*. Cambridge, Massachusetts: Educators Publishing Service.

Orgel, J. R. 1977. *Reading Comprehension: Handbook Of English Reference And Study Guide*. Cambridge, Massachusetts: Educators Publishing Service.

Pauk, W. 1976. *Essential Skills Series 7–12*. Providence, Rhode Island: Jamestown Publishers.

Salisbury, R. 1966. *Better Work Habits*. Glenview, Illinois: Scott, Foresman.

Sohn, D. A. (ed.). 1965. *Ten Modern American Short Stories*. New York: Bantam Books.

Taggard, E. (ed.). 1976. *Twenty Grand Great American Short Stories*. New York: Bantam Books.

Walsh, F. 1977. *The Regis Study Skills Guide*. New York: Regis High School.

Welsh, M. M. 1968. *Reading/Writing Workshop A*. New York: Harcourt Brace Jovanovich.

Warriner, J. E. 1977. *Composition: Models and Exercises, First Course*. New York: Harcourt Brace Jovanovich.

Whitten, M. E. 1975. *Creative Pattern Practice—A New Approach to Writing*. New York: Harcourt, Brace, Jovanovich.

Assisting Dyslexic College Students: An Experimental Program Design at a University

Barbara Cordoni, Ph.D.

Southern Illinois University-Carbondale
Carbondale, Illinois

Although there are some programs for dyslexic students at the post-secondary level, most of them are in community colleges and not in the four-year colleges and universities. The cost of support services furnished is often high—as much as three to eight thousand dollars in extra costs per year. Thus, poor and middle income students cannot have access to programs which they need.

Another problem is that data gathering, in existing programs, appears to center mainly on test results in academic areas only and overlooks other equally important areas. Obviously, academic problems are present in dyslexic college students, but there are other areas of difficulty about which information gathering is also of critical importance. If post-secondary institutions are to serve a learning-handicapped population successfully, there is the need to know and understand various aspects of the disability. When a learning disability exists, it goes beyond academic problems in its effect upon the individual and enters into other aspects of living. To deal with the total problem, educators must draw upon the knowledge of other disciplines in order to obtain useful data about each student, particularly in areas of neurophysiology, language processing, and social skills.

We are attempting to do this at Southern Illinois University (SIU-C) where, for many years, there has been a commitment to handicapped individuals. Because of that commitment, SIU-C already had established services on campus of a kind not generally available at many other universities. SIU-C, therefore, seemed to provide an ideal setting in which to begin a college program for students with specific learning disabilities.

Dr. James O'Donnell, Associate Professor in the Department of Psychology and the father of a dyslexic child, and Dr. John Anderson,

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Coordinator of the Speech and Hearing Services at the SIU-C Clinical Center, are researchers with many years of experience. They have added a needed dimension to our efforts as we have begun to define the questions about what we need to know in order to establish a successful program.

Defining the questions is a difficult aspect of such a project for one has no data base from which to begin and, except for a few isolated studies involving small and ill-defined populations, the literature is not helpful. For our purposes, it appeared that a pilot study should be conducted to determine: (1) which of the numerous tests we planned to use would be the best predictors of academic performance; (2) which skills were the most critical at the college level; (3) which intervention system would be most effective in attaining academic success; (4) what major problems the students were likely to have; (5) what might be the degree of faculty resistance to the program; and (6) how we could best integrate the available services in meeting the needs of individual students.

To attempt to answer these questions, we chose a two-dimensional approach. First, there was the diagnostic component. The three disciplines represented—special education, clinical psychology, and speech pathology and audiology—offered a large number of testing instruments. The difficult task was to select instruments that would serve effectively to discover the problems of each student. Few testing instruments are designed for or normed on college age populations and virtually none of them specifically for the dyslexic or learning-disabled college student. Yet, what we had gleaned from a review of the literature suggested that measures of social skills and self-concept were important and that language functioning should be examined in several of its aspects—rigidity, receptive, expressive, dichotic listening, and problem solving (Semel and Wiig 1976). Left and right hemispheric processing, correlated with other measures, interested us, as did the patterns of disabilities, identified by Bannatyne (1971) and Boder (1971), and the intercorrelational studies of test scores.

The second dimension of our approach was to investigate intervention systems. We wanted to know which techniques were most effective with the college-age student. The techniques selected for investigation were the use of group sessions, individual tutors, peer advocates, and specialized student services. Specialized services included those already on campus—the Clinical Center to provide therapy, diagnosis, and remediation services; the Student Supportive Services to provide "talking books," slow-speed tape recorders, and administration of oral tests. How many students would need services, what kind and scope of services would be most effective, how faculty would respond to proposed measures, and how the quantity and quality of services would correlate with achievement—these were some of the questions we hoped that we could address.

We applied for and received internal funding for a one-year pilot project to begin in June of 1978. Although the project was designed to accommodate only 10 students, we will in fact have tested and supported about 20 students in the course of the year. In preparation for the next phase of our project, we are analyzing the data collected from these students so that we can determine which factors are critical for successful performance in college.

In June of each year, over a four-year period, we plan to take 25 students into our research project. Each set of 25 will be selected on the basis of a particular pattern of difficulties. Our first group of students, for example, consists of students randomly chosen from applicants whose IQ's indicate potential for college achievement but whose reading achievement scores are at least four years below college freshman level. These students are matched with 25 other entering freshmen who have similar IQ's but with adequate reading achievement scores. The second year's group will consist of students who show the dyscalculia-dysgraphia pattern of disabilities described by Johnson and Myklebust (1967). Each year a different pattern of disabilities will be investigated and we will obtain a data analysis on the differences among the various groups.

The data we have accumulated thus far are preliminary only but still provocative and indicate areas worthy of investigation. For example, we have found that all of the students with learning disabilities miss most, if not all, of certain questions on the WAIS Information subtest. They miss the questions on location of countries, the questions which relate to dates, population, height, estimation of miles, temperatures, and the number of senators in the U.S. Congress. In other words, this group of students could not respond effectively to spatial-temporal items on the test. Furthermore, these questions are missed regardless of whether the student's verbal score or performance score is the higher one. There seems to be no correlation with the number of years spent in special education classes where, one might suspect, such information may not have received much emphasis. Also, there is no correlation with IQ score per se. These questions are missed whether the IQ score is 150 or is 113, the range represented in our pilot project.

Another finding that intrigues us concerns auditory memory. On the Malcomesius test, the largest number of errors in all but one case was in the Auditory Memory to Motor subtest, yet the dichotic listening skills test did not differentiate between our handicapped students and the non-handicapped students.

When we analyzed the scores of the Peabody Individual Achievement Tests, all of the students fell within only a month or two of a grade 10.5 equivalent on the spelling subtest, with reading recognition the next lower score. We do not yet know if the scores are the results of faulty test design or inappropriateness or whether they are truly indicative of disability patterns in this particular group.

In administering the Tennessee Self-Concept Scale, we noted that our students expressed few definite opinions. Generally, they seemed to prefer to circle ratings that were equivocal, or perhaps they felt safer, but they did not select ones that were either positively or negatively strong. Lowest ratings were on questions that have to do with how pleased one is with one's self. The only exception to this pattern was in the self ratings of an attractive young woman who is much sought after by males.

Mathematics scores showed a significant decrease when the student had to write the answers. Some students reversed direction and worked from left to right incorrectly on problems. Motor problems seemed to be a definite problem in this area. Some of our students showed us quite graphically how motor difficulties trouble them. One student, given the stimulus *212°* orally, wrote *122°* upon two different presentations. When asked what the stimulus had been, she replied *212°*. Some students have asked, "Why can I do it so much faster in my head than on paper?" We found that none of our students knew the multiplication tables, so that we have taught them "finger multiplication." The difficulty with multiplication existed even in students who were able to do higher mathematical equations.

We noted that none of our students had been able to succeed in their high-school typing courses. Consequently, we have placed them in the Typing Keys Program, published by Academic Therapy, and we find that they can function in this program quite well. Some of them, however, need to massage their fingers before each typing session so that they can increase their haptic awareness. Since the typing program is designed to improve spelling as well, we will examine post-testing results to determine its effectiveness in this area.

Often noted in the literature on dyslexia is the incidence of left-handedness. According to Haggar (1968), "That they [left-handedness and dyslexia] are closely related is beyond doubt. Apart from the confusion of spatial orientation evident in the writings of dyslexic children, about 50 percent of them are left-handed and uncertainty about handedness is shown by a much higher proportion than in the general population." Cole (1951) has stated, "In the case of the child with reading disability, this has been recognized as associated with uncertain dominance from a hereditary point of view and from the point of view of actual body patterns in terms of handedness and eyedness." The question of handedness is not a recent one. More than fifty years ago, Gordon (1921) noted that 53.9 percent of the speech-handicapped children in the London special schools were left-handed. Orton (1928) noted a higher incidence of sinistrals in the stuttering individuals he examined. We found left-handedness in 60 percent of the students in our program.

Kinsbourne and Warrington (1966) noted higher Performance than Verbal scores on the WISC administered to learning-disabled children from families with related problems. All of our students have family members with learning disabilities, but all except two students had higher Verbal than Performance scores. It may be that the students we are seeing are those who have completed high school and, therefore, had an advantage with higher verbal skills over those high school students who had higher performance skills. Their final achievement in high school may have been more successful. As we study more groups in the succeeding years, we may be able to determine if this is the case.

In studying our students, we noted that socialization skills were often deficient. Our students show a tendency to bluntness which does not lead to an easy flow in personal relationships. Although there is variation among the students in the degree of socialization skills, all of them reported difficulty in making friends and most reported that only in the preceding year or two had they begun to make a few friends. They appear to have problems with closure skills, misperception of facial and body expressions and seem unaware of social clues. To help them develop socialization skills, we have assigned peer advocates to them.

Although not all of our students in the program need peer advocates, all of them do need tutors. Most students need only one tutor who covers areas of need in specific subjects part of the time and gives basic remedial training the rest of the time. Other students, however, need two tutors, and this is in addition to the typing program. All tutors are carefully selected from among graduate students who are working for degrees at either the Master's or Doctoral level in Learning Disabilities in the Department of Special Education. The graduate students who tutor are either paid or receive practicum credit.

Tutors must keep journals on their students, arrange for books on tape, obtain tape recorders for those who cannot take notes, and arrange for oral testing when needed. They use computerized programs to cover course material such as Algebra or Biology. Tutors routinely teach their students to organize written assignments and to understand the critical components of a paragraph read. The effectiveness of the tutoring is indicated by the fact that the students have remained in the program and none of them are failing in their courses.

The first phase of our program has not been without problems. It is gratifying, however, to know that we have identified some of the questions for which we must now find answers, and we have discovered some of the problems that dyslexic students have at college age, and we are developing methods for dealing with them.

During the next four years, as the program increases in size, we expect to continue to refine our procedures and integrate new services with existing ones so that the program will become self-supporting. We plan to expand our program by 1979–80 to include the four community colleges in our consortium. Also during that year, we expect to complete a program implementation handbook and a slide presentation for training purposes. Workshops for interested college and university personnel will be held at SIU-C.

Although we are still in the initial stages of our program and our design is still an experimental one, our conviction is strong that dyslexic students can be served and can succeed in regular college courses at a large university and that they can eventually earn their degrees.

References

Bannatyne, A. 1971. *Language, Reading and Learning Disabilities.* Springfield, Illinois: Charles C Thomas.

Boder, E. 1971. Developmental dyslexia: A diagnostic screening procedure based on three characteristic patterns of reading and spelling. *In* B. Bateman (ed.). *Learning Disorders,* Vol. 4. Seattle: Special Child Publications.

Cole, E. 1951. Specific reading disability: A problem in integration and adaptation. *Amer. J. of Ophthalmology* 34(2):226–232.

Gordon, H. 1921. Left-handedness and mirror writing especially among defective children. *Brain* 43(4):313–368.

Haggar, T. 1968. Congenital word blindness or specific developmental dyslexia: A review. *Medical J. of Australia* 1(19):783–789.

Johnson, D. and Myklebust, H. 1967. *Learning Disabilities: Educational Principles and Practices.* New York: Grune and Stratton.

Kinsbourne, M. and Warrington, E. 1966. The developmental Gerstmann syndrome. *In* J. Money (ed.). *The Disabled Reader: Education of the Dyslexic Child.* Baltimore: The Johns Hopkins Press.

Orton, S. T. 1928. Specific reading disability—strephosymbolia. *JAMA* 90(14):1095–1099.

Semel, E. and Wiig, E. 1976. *Language Disabilities in Children and Adolescents.* Columbus, Ohio: Charles E. Merrill.

Dyscalculia and Dyslexia

Kaia Svien and Donna Sherlock

ELDA Reading and Math Clinic
Minneapolis, Minnesota

Attempts to define learning disabilities have aroused controversy, but the inclusion of dyscalculia as one learning disability has not been in question. Nevertheless, arithmetic as an area of academic difficulty is often overlooked in the diagnosis and treatment of dyslexia and other learning disabilities. The purpose of this paper is to call attention to this area of neglect, to offer some insights into the problem, and to illustrate some of the similarities to be found in dyscalculia and specific language disabilities.

We have had the opportunity to work on specific arithmetic disabilities with approximately 40 students on a one-to-one basis in a clinical setting. Following evaluation, we have tutored the students for an average of about 20 hours each. The students have ranged from 6 to 42 years in age, and they have differed widely in learning potential, severity of disability, and self-esteem. Through insights gained in the tutorials, we have been able to alter our remedial approach and apply techniques gained through training in the Orton-Gillingham approach to remediation of specific language disability. We have found our understandings of dyslexia directly applicable to developing our understandings of dyscalculia.

Written Language and Mathematics

We have found it useful to compare remedial approaches and techniques for written language (reading, spelling, and writing) and for the language of mathematics (arithmetic, computation, and notation). In this country, written language problems first received attention with the identification of *strephosymbolia* by the neurologist, Samuel Torrey Orton, in the late 1920's (Orton 1937). The subsequent work of Anna Gillingham with Orton provided a well-developed body of remedial techniques along

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with the physiological and philosophical perspectives. Both perspectives and techniques are increasingly shared by educators today, and a considerable amount of the substantive work in the remediation of learning disabilities now springs from the Orton-Gillingham approach. Contributions drawn from a number of disciplines—neurology, psychiatry, pediatrics, ophthalmology, psychology, speech pathology, learning theory, and education—have been numerous and varied and enriched by ideas drawn from the different areas of expertise.

A major contribution is the use of a specific vocabulary to describe the information-processing deficits of specific learning disabilities. Such terms as visual memory, sequential ordering, etc., provide practitioners of remediation with a means of bridging the gap between learning behaviors and the content of material to be learned. Supporting the terminology is a framework, formulated by Orton and added to by others, which takes into account neurological functions and thus gives us a reference point for the cluster of symptoms frequently encountered. It also provides the basis for effective remedial techniques.

In recent times, written language disorders have been the subject of research projects, experimental programming, teaching materials development, and the focus of federal grants. The support for the Right to Read program, for example, indicates the extent of national recognition of literacy as an important problem of our society today. Unlike literacy, however, mathematics—or its beginnings in arithmetic—has not been viewed as a critical area of need. Perhaps this is so because survival in our technological society is not as dependent upon getting the right change after a purchase as it is upon the ability to read a sign such as "Danger. Explosives." The failure to acquire basic computational skills has not been viewed as meriting the amount of attention, research, and funds given to failure to acquire literacy skills.

Learning Problems in Arithmetic and Mathematics

Recently, however, some attention has been given to learning problems in arithmetic and mathematics. Generally, the result has been a focus on the use of manipulative materials in an effort to compensate for learning deficiencies through provisions of concrete learning experiences. This approach, more widely used in Great Britain than in the United States, is based upon Piaget's concepts of cognitive development through which children move (Copeland 1974). While the use of manipulative materials seems to have helped many pupils, learning-disabled or not, to grasp the mathematical concepts that had earlier eluded them, a significant number still do not profit. We believe that in these cases the underlying disability is not in concept formation but in the language of mathematics and its symbolic code.

A review of studies in diagnosis and/or remediation of dyscalculia indicates that relatively little research has been undertaken. Suydam (1970) found 107 studies conducted between 1900 and 1965. We have not found helpful, on the whole, the studies specific to dyscalculia but rather the single chapters on that subject contained in publications devoted to learning disabilities in general. In this respect, we have found Myklebust and Johnson (1967) and Chalfant and Scheffelin (1969) the most useful.

In 1977, the annual meeting of the Research Council for Diagnostic and Prescriptive Mathematics was brought to a close with its president's call for more research into mathematics failure (Heddens (1977, p. 96). After noting the existence of reading centers, specialists for other kinds of learning impairments, and hospitals for physically disabled people, Heddens asked, "Where do we have professionally trained individuals working with children suffering from mathematics difficulties such as acalculia and dyscalculia? Why haven't the individuals responsible for mathematics developed and prepared instruments, materials and techniques for remedial mathematics?"

For the most part, remediation in computation and mathematics has been left to classroom and mathematics teachers, whose approach is based on content material on the whole, rather than to the remedial approaches needed by children with dyscalculia. In contrast, remediation in dyslexia employs specialists who have knowledge of both the content material of written language and the nature of specific language disabilities. These specialists have a well-developed body of knowledge that can be adapted to the language and symbol system of mathematics in remediation. We would suggest that at least two components of that body of knowledge can be applied to remediation of dyscalculia.

The first component, which can be applied to the remediation of dyscalculia, is the information-processing deficit framework. The second is the view that the prerequisite to the use of a written system is the accurate decoding and encoding of the symbols employed in that system. Reading and writing in English require automatic and accurate decoding and encoding of the alphabet; arithmetic and mathematics require automatic and accurate decoding and encoding of numerical and other symbols. Clearly, the two codes, alphabetic and numerical, are not the same, but

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viewing them in the same light for remediation purposes opens up new avenues of approach. As illustration of the two components, information-processing deficit framework and the prerequisite skill of accurate, automatic decoding and encoding, we suggest "error classification."

Error Classification

We will examine common arithmetic errors and the "standard" response to the error. Following this, we will illustrate a different response, one that uses the information-processing deficit framework. Next, we will suggest a classification system for arithmetic errors that, to a large extent, parallel errors in written language. We look upon the information-processing errors as "constants" and easily identifiable in various subject areas. Once practitioners learn to identify the processing errors, they can work with them easily in a variety of situations.

A common error is addition, instead of subtraction, as in

$$\begin{array}{r}20\\+8\\\hline 28\end{array}\qquad\text{instead of}\qquad\begin{array}{r}20\\-8\\\hline 12\end{array}$$

and this is commonly interpreted as the pupil's lack of conception of place value. The usual response of the classroom teacher is to return to manipulative material, such as the stick bundles of ones and tens (Ashlock 1972). Undoubtedly, working with this or other manipulative material will clear up the problem for some students if the problem is one of concept of place value. Certainly, it is essential to ascertain the learner's conceptual understanding of a process, and this is the first task of the teacher. If the problem persists, however, and the concept is indeed understood, then the probability is that information processing is at fault. For example, there may be a "directional" problem, as in reading *no* for *on* except that the arithmetic confusion is on a vertical plane rather than horizontal. In this case, working on accurate processing of direction is indicated rather than working on the concept of place value.

Another frequent error is the transposition of numerals as in reading *17* for *71*, also analogous to the directional confusion of *no* and *on*. It is not the concept of place value, but the way in which the written information was processed, that caused the error. An additional problem with the reading of numbers in the teens, as in *17* and *71*, is that teens numbers are read from *right to left* and thus break the rule that numbers are read from *left to right* as in *37 (thirty*-seven) or *25 (twenty*-five) but *14 (four*teen).

The two examples cited suggest that moving from *mathematical* explanations of particular categories of errors to *learning disability* explanation would, in many cases, be the more appropriate strategy. We do not, however, disregard the remedial techniques that offer students, concrete experiences for the development of concepts; we do suggest that for pupils with dyscalculia, additional teaching techniques are usually necessary.

We find especially useful an errors classification system that lays out analogous errors in language and arithmetic. The system proposes parallels of difficulty in the two symbol systems, alphabetical and numerical. Use of such an errors-classification system should enable the application of an information-processing deficit framework to generate remedial techniques modeled upon the strategies found to be effective for specific language disability. Illustrative errors given below are drawn from those made by adolescents or adults who were treated in our clinic. All of these students had adequate learning potential, the necessary conceptual understandings, and the motivation to learn.

Numerical Errors	*Alphabetic Errors*
Reads *360,402* for *306,042*.	Reads *brun* for *burn*, a transposition.
Working on written problem with $2x$, midway shifts operation to x^2.	Similar to above.
Reads *39* as *93*.	Similar to above.
Writes *3/5* but intends *5/3*.	Writes *was* but intends *saw*.
Writes *72* but intends *27*.	Similar to above.
Given a dictation of *four thousand thirty-two*, writes *4,000,32*.	Given dictation of word *strain*, *writes strane*.

Some of the memory problems encountered in dyscalculia are similar to those encounterd in language problems. For example, some students cannot recall multiplication facts in either visual or oral presentations. This is similar to the dyslexic students who remember plot and personalities in stories but cannot recall the names of people or places. In still other students, problems of decoding and encoding of numbers persist as do the problems of decoding and encoding of words in dyslexic individuals. Some examples are given below with analysis of the underlying difficulty.

Errors	*Analysis*
Reads *5,102* as *five, one hundred and two hundred.*	Does not recognize underlying pattern of hundreds, tens, ones and/or the commas as signals for words that change according to the number of commas, i.e., *thousand, million,* etc.
Writes *4,23* for dictation of *"four thousand twenty-three."*	Expected one-to-one correspondence between auditory message and encoding of numerals. Here, the comma was placed correctly for *thousand* but no place holder was encoded for the hundreds position because that position was not stated explicitly.
Given orally *6 × 3 is . . . ,* the response is given correctly as 18. When given 3 × 6, one student responded with anger, "Eighteen, but it makes me mad. It's like saying that Peter Jones is my name is the same as saying that Jones Peter is my name."	Discussion with this student, an articulate man of 23, revealed that he was frustrated by the coding system as he saw it. Operations, whether or not reversible, can be written either horizontally or vertically as in: $6 \times 3 = 18$ or $\begin{array}{r}6\\ \times 3\\ \hline 18\end{array}$ While this multiplication can be written horizontally or vertically with the same result in either case and 6 × 3 can produce the same result as 3 × 6, that is not so for $\begin{array}{r}10\\ -4\\ \hline 6\end{array}$ and $10 - 4$ is not the same as $4 - 10$. The student who found this so frustrating suggested that reversible operations should be written horizontally and the irreversible ones vertic-

ally so that the concept of reversibility would not be "blurred" by the coding practices.

Given 304
×3
The response was *312*.

After multiplying 4 × 3 correctly, this student "carried" the *one* and finished the problem as addition.

In working with students who have problems of the sort noted above, or others, it is important to analyze the errors. Are they conceptual, perceptual, or both? Is faulty information processing eroding the students' understanding of a concept? Task analysis should include analysis of possible visual or other confusions. With prior task analysis, the tutor can anticipate possiblities for errors and adopt teaching strategies to forestall them. Some students can be helped to avoid confusions with symbols such as × and + through verbal mediation, either through subvocalization or "internal" language, or through actual speech.

Conclusion

It is our hope that more practitioners in the field of learning disabilities will include the diagnosis and treatment of dyscalculia as they work with children and older individuals. Although there is much more to be explored, we believe that our clinical experience indicates that information-processing deficits may be a contributory factor in the disability and thus warrant further investigation. Furthermore, we believe that insights gained in the treatment of specific language disability may be fruitfully applied in the treatment of dyscalculia.

References

Ashlock, R.B. 1972. *Error Patterns in Computation.* Columbus, Ohio: Charles E. Merrill Publishing Company.

Chalfant, J.C. and Schefflin, M.A. 1969. *Central Processing Dysfunctions in Children: A Review of Research, Phase 3.* Bethesda, Maryland: United States Department of Health, Education and Welfare.

Copeland, R.W. 1974. *How Children Learn Mathematics.* New York: Macmillan Publishing Company.

Heddens, J.W. 1977. A perspective on the future. In *Clinical Investigations in Mathematics Education.* Bowling Green, Ohio: Bowling Green State University Press.

Myklebust, H. and Johnson, D. 1967. *Learning Disabilities: Educational Principles and Practices.* New York: Grune and Stratton.

Orton, S.T. 1937. *Reading, Writing and Speech Problems in Children.* New York: W.W. Norton and Company.

Suydam, N.N. 1970. The status of research on elementary school mathematics. *In* R.B. Ashlock and W.L. Herman, Jr. (eds.). *Current Research in Elementary School Mathematics.* London: Collier-MacMillan, Ltd.

Dyslexia Defined, by Macdonald Critchley and Eileen A. Critchley. 1978. London: William Heinemann Medical Books Ltd. 161 pp. (Also available from Charles C Thomas, $15.50.)

Since the publication of his now classic, *Developmental Dyslexia*[1], Dr. Macdonald Critchley, the eminent London neurologist, has been recognized as one of the world's foremost authorities on the subject. In 1970, he gave us the extensively revised issue of the 1964 book, newly entitled *The Dyslexic Child*[2]. Dr. Critchley, past-president of the World Federation of Neurology, has been a long-time contributor to the Orton Society, both in his presentation of major papers at annual meetings and in publishing outstanding articles in this *Bulletin.* He and Eileen Critchley have collaborated to provide this important new book, designed to help clarify some of the confusing issues about dyslexia. While intended especially for parents and teachers, professionals should find the book stimulating and helpful.

Many experienced professionals, interested in the complexities of developmental dyslexia, find it difficult to understand the sometimes emotionally-charged differences of opinion expressed by various writers. Some flatly deny that there is such a syndrome as dyslexia; others strongly affirm its presence but they present divergent views, sometimes bordering on the fanatical, as to what it is and what it is not.

In this book, the Critchleys thoughtfully approach the problem by offering a sober discussion of the most important areas of misunderstanding. In a scholarly way, they have attempted to clarify many of the controversial areas pertaining to the diagnosis and treatment of dyslexia. In eminently readable English, they have succeeded in presenting 12 brief chapters which are highly interesting and enlightening. While providing clarification of issues in simple language, the authors have skillfully interwoven the scientific matrix.

The chapter on "Putting Pen to Paper" is especially interesting; it emphasizes the much neglected teaching of handwriting to children and includes a small section on spelling. Filled with illustrations and fascinating examples, the chapter is a major contribution to our knowledge.

Another major contribution is provided by the chapter on "Dyslexia-equivalents: dyslexia variants." Comparing atypical cases of dyslexia to the

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[1] Macdonald Critchley, *Developmental Dyslexia* (London: William Heinemann Books Ltd, 1964).

[2] Macdonald Critchley, *The Dyslexic Child* (Springfield, Illinois: Charles C Thomas, Publisher, 1970).

formes frustes (partial anomalism) variations in specific medical conditions, a good case is made for seeing many of the puzzling cases of atypical language disorders as being *formes frustes* dyslexia—i.e. variants.

Perhaps the weakest chapter is that on "Arithmetical Ability and Dyslexia." The "new math" has, as predicted by Jastak and Jastak[3], produced nearly as many students with arithmetic problems as with language problems. These would fit Critchley's "secondary" category, described in his suggested classification early in the book. However, he flatly states that dyscalculia is a neurologically determined *loss* of mathematical ability and that term should not be used otherwise. This is not in keeping with the insightful chapter on dyscalculia by Johnson and Myklebust in their earlier publication[4], nor does it agree with the extensive experience of this reviewer.

A serious omission in the book is the absence of a chapter discussing the emotional factors related to dyslexia, including the impact upon families. Perhaps the authors felt that they should orient the book primarily to neurological aspects of the syndrome. Yet the emotional repercussions are so widespread and so serious that it seems to this writer to be dangerous to omit them from the discussion.

After 11 chapters of clarification, most of which is done elegantly, the final chapter attempts to sum it all up. This is a difficult task indeed. In attempting this, the Critchleys introduced material from Rutter's[5] work but failed to deal adequately with Rutter's findings. This is certain to confuse some readers. This chapter (and the book) ends with a new definition for developmental dyslexia. This impresses me as the best definition yet, but it will not satisfy everyone. Read the book and see what *you* think about it! I recommend this book very highly and predict that it will be read and quoted for many decades. I hope that it will be studied by large numbers of educators and parents. The book is guaranteed to provide exercise for the mind of every person who reads it.

Carl L. Kline, M.D., F.R.C.P. (C)
Department of Psychiatry, Faculty of Medicine
University of British Columbia, Vancouver, B.C., Canada

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[3] J. F. Jastak and S. R. Jastak, *Wide Range Achievement Manual* (Wilmington, Delaware: Guidance Associates, 1946).

[4] D. J. Johnson and H. R. Myklebust, *Learning Disabilities: Educational Principles and Practices* (New York: Grune and Stratton, 1967).

[5] M. Rutter and W. Yule, The concept of specific reading retardation. *J. Child Psychol. Psychiat.* 16 (1975) 181–197.

Programs of the Brain, by J. Z. Young. 1978. Oxford: Oxford University Press. 325 pp. $14.95.

This book is based on the Gifford Lectures given by Young at the University of Aberdeen in the years 1975–77 following his retirement as Professor of Anatomy at University College, London. The author has been a central driving force in the modern growth of the neural sciences. Young's career in the field started in the twenties when one person could comfortably keep up with the entire world literature of research on the nervous system. He continues today, 50 years later, to be active in what is now the fastest growing of all scientific fields, a discipline growing so rapidly that no one person can keep up with more than a few selected topics.

Young's own contributions range all the way from investigation of single nerve cells to research on the mechanisms of memory. They illustrate vividly the importance of research which is not bound to any practical end. Young discovered that the squid contained single giant nerve fibers so large that they can be seen with the naked eye. This curious finding of giant nerve fibers (with diameters ten times greater than those of the largest fibers present in humans) in a marine invertebrate turned out to provide exactly the experimental preparation needed for study of the mechanisms of conduction of the nerve impulse. Alan Hodgkin and Andrew Huxley of Cambridge eventually won the Nobel Prize for their experiments on the squid giant fiber, the results of which turn out to be essentially applicable to all nerves throughout the animal kingdom.

Young's interest in marine invertebrates led him to study a totally different level of nervous activity, i.e., the anatomical systems underlying memory. As early as 1940, he and his co-workers had begun to separate out the components of these systems in the cuttlefish and the octopus.

The obvious theme at the base of Young's presentation in this book is that the function of the brain is a reflection of its pattern of connections, and that by understanding the circuitry of the brain in action we will come to a deeper insight into behavior. The book is an attempt to show the layman how the brain is programmed to carry out its functions.

He starts with the simplest or—perhaps, more correctly—the most elemental aspects of nervous functions, with the nerve cell itself, the transmitters that stimulate nerve cells and the basic elements of coding of information by nerve networks. He goes on to discuss rhythmic processes in the nervous system, and the development of the nervous system. This is followed by a discussion of learning and memory, which is perhaps the best discussion in the book.

In subsequent sections he deals with sensory systems involved in emotional behavior. The following chapters deal with language, consciousness, sleep and dreaming, and philosophical issues. It would be impossible to summarize all of Young's views, but it can confidently be asserted that he always writes lucidly. The attentive reader will find much of what Young says provocative, since many of the views he expresses are likely to be surprising and sometimes upsetting to those who have never considered some of the possible implications of research on the neurological foundations of behavior. The reader who is prepared to attend carefully to the arguments and to accept or reject them after careful consideration will benefit from the experience.

No topic is dealt with in detail, nor is every topic dealt with adequately even at an elementary level. The section on aphasia almost entirely overlooks the advances of the last fifteen years and uses a classification that is contradictory and therefore confusing. Other surprising omissions are those of the effects of early sex hormonal exposure on later behavior and cognition, a topic of special concern to those who wonder why developmental learning disabilities have such a distinctly male preponderance. The reader must therefore be wary at times as to the completeness and the authoritativeness of what he is reading. Yet one can hardly criticize Young for the fact that the growth of the neurosciences, in which he has played a major role, has surpassed even his scope.

There is probably no other book which so clearly and in so short a space can bring an uninitiated reader to a concept of the directions of neurological research on behavior. The fact that the author is prepared, although with disarming charm, to introduce potentially controversial material only adds to the value of this book for those who wish to expand their horizons.

Norman Geschwind, M.D.
Professor of Neurology,
Harvard Medical School

Language Handbook: Concepts, Assessment, Intervention, by John R. Muma. 1978. Englewood Cliffs, New Jersey: Prentice-Hall. 390 pages. $15.95.

This book is divided into four units: Language Intervention Model, Conceptualization, Assessment and Intervention Principles, and Specific

Assessment-Intervention Procedures. The chapters on the nature of language, cognitive systems, linguistic systems, communicative systems, and language acquisition include extensive research references current to time of publication. The value of these chapters is having available in one text such complete summaries of current theories of cognition, linguistics, and communication.

Muma is critical of psychometric norms as a means of language assessment and evaluating intervention. "The result is that they deal with superficial aspects of language: the *products* of acquisition. Current approaches deal more with underlying *processes*. Normative approaches deal with *what* an individual does; process approaches deal with *how* an individual does it" (p. 146). In discussing notions and fallacies of traditional assessment, he criticizes the definitive test usage because there can be variations among responses of normal individuals to a test. Muma also questions the ability of tests to assess the specific areas which they purport to measure, such as psycholinguistic ability, vocabulary, and memory. In his view, it is unfair to make judgements about a child's language or behavior from a single sample evaluation. The objectivity notion, he believes, is not appropriate and subjective judgements are more clinically appropriate. Muma states that, although normative assessment procedures may have some value, "they undermine the individual," and his objection is that "quantification of behavior runs the risk of perpetuating arbitrary categories that have no real value." He also believes that assessment and intervention must not be separated as in the medical model because they are "continuous, ongoing, and inextricably related."

Muma advocates that clinicians "should think in terms of descriptive procedures rather than tests." "The assessment of verbal behavior can be conducted according to four approaches: (1) descriptive/quantitative, (2) knowledge/usage, (3) form/function, and (4) informal/formal" (p. 220). According to him, descriptive approaches are more useful than quantitative if one wants to understand the nature of and plan for the problem; they are more relevant to intervention. He stresses the importance of the clinician's knowing the conceptual difference between linguistic knowledge and usage and recommends first studying verbal functions and later linguistic forms. Muma believes that informal assessment provides more representative samples of the child's language than is provided by formal approaches.

In discussing traditional intervention with language problems Muma states that much of what is done is "arbitrary, capricious, and authoritarian," and he provides the intervention principle central to his thesis. "I

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propose that the best we can do is describe (not quantify) an individual's command (knowledge and use) of cognitive-linguistic-communicative systems as he functions naturally or near naturally, then exploit his behavior" (p. 230). He stresses the importance of helping the child learn language in as natural a context as possible.

Muma refers to the consolidation of several cognitive systems and processes reported in developmental psychology into an assessment-intervention package called MAP (Muma Assessment Program, Muma, in press). He states that the instrument provides a way of describing an individual's command of cognitive, linguistic, and communicative systems using perceptual salience, iconic/symbolic processing, rule/nonrule learning, primacy/recency memory functions, technology of reckoning, cognitive tempo, part/whole and alternatives thinking styles, differentiation of body parts, cognitive distancing, and categorization/mediation.

This volume contains four valuable appendices: relevant publications; introductory grammar/semantic-syntactic domains; phonetic and phonotactic processes; and developmental sequences and strategies.Also included are an extensive list of references and a glossary of terms.

Muma states that this is a practical handbook written by a clinician for clinicians who are primarily speech/language pathologists. His integration of an extensive body of literature into his notion of assessment and intervenion of cognitive-linguistic-communicative systems and processes is impressive, and his skills as a clinician are evident by his examples throughout the text. This reviewer's impression, however, is that the book may have more value for the sophisticated clinician who has an already developed theoretical and practical background in linguistic-cognitive processes and less value for the student or beginner in the field.

Regina L. Cicci, Ph.D.
University of Maryland
School of Medicine

Learning Disabilities: A Family Affair, by Betty B. Osman. 1979. New York: Random House. 224 pp. $8.95.

Ms. Osman is an educational therapist who states that this book "tries to help both parents and professionals recognize where children may be having difficulty and suggest ways to make their lives easier at home and at school." There are eight chapters: Early Signs and Symptoms, It's a Family Affair, Life at Home, The Social Connection, Life at School, The Homework Question, Community Resources, and What About the Future?

Although the term *learning disabilities* is used in the title of the book, the author prefers (and uses throughout the text) the term *learning difference.* A learning difference is described as the discrepancy or lag between overall intelligence and the ability to learn in one or more areas. With such a definition, wide variations in learning and handicapping conditions may be included. It is evident from the many illustrative examples provided that the writer has had experience in treating many kinds of problems. A warmth and an understanding of the children and their families is reflected in the writing. But the many examples provided could apply to normal children as well as to any child handicapped in learning. This may be confusing rather than helpful.

The writer states that three general areas encompass some of the symptoms of a learning difference. These are (1) language and concept development, (2) perceptual skills, and (3) behavioral manifestations. This classification is so oversimplified that it could be misleading to the reader. Osman also suggests that etiological considerations are not important because the child must be treated for his educational and behavioral symptoms. This reviewer finds it difficult to accept this notion because, for example, an approach to a child with a learning problem differs considerably when the child is emotionally troubled from when he has failed to learn because teaching approaches have not matched his type of learning pattern. There are also overgeneralizations about social and behavioral components with implications that all children with learning differences have social and/or behavioral deviations. Suggestions are made that the learning differences persist into and cause problems in adolescence. This reviewer's experience is that not all learning problems have social consequences and that many learning-disabled children do not have unusual problems in facing adolescence.

Osman's approach to a complex problem is so general and oversimplified that it confuses rather than clarifies the nature of learning disabilities. The text may be of some value to some parents because there are specific suggestions as to management. It is regrettable, however, that the emphasis is so much on what the parent might do to help with so little suggestion as to the value of professional consultation.

In contrast to the text itself, there is valuable practical information in the remainder of the book. There is an annotated bibliography of books, pamphlets, and journals. The appendices include lists of organizations and resources for information; diagnostic tests; and colleges, universities and post-secondary school programs that accept learning-disabled students. There are also specific suggestions for parents participating as part of a school's educational planning team; parent and child educational rights under the law; and precise information regarding testing and evaluation and interpretation of the school's individual educational plan (IEP).

—Regina L. Cicci

Psychological Testing of Children: A consumer's guide, by Stanley D. Klein. 1977. Boston: The Exceptional Parent Press. 106 pp. Cloth $6.95. Paper $3.95.

As a clinician and as the parent of a learning-disabled child, I welcome the opportunity to review Dr. Klein's book. In spite of my professional experience, I still become confused by contradictory test results and variable interpretations. Therefore, I can testify to the need for a book to aid parents in understanding the outcome of psychological assessments and to explain the principles of the techniques currently in use by clinicians. This volume on psychological assessment of children contains ten articles that appeared originally in *The Exceptional Parent* magazine in 1972 and 1973. Klein's purpose in writing the articles was to inform parents about psychological test reports by presenting the logic of test development and design.

The first chapter discusses tests as behavior samples and stresses the importance of adequate sampling techniques. The author's descriptions of sampling procedures are straight-forward and clear. Other aspects of test construction unfortunately are not as clearly presented. Questions of reliability and construct validity which are being raised increasingly in the literature in relation to disability testing are not addressed here.[1] This is lamentable because tests of unproven reliability and validity impose serious restrictions on the educational and remedial implications of the findings and on the credibility of the professionals who use them without proper acknowledgement of their limitations.

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[1] See, for example, G. S. Coles, "The learning-disabilities test battery: empirical and social issues," *Harvard Educational Review,* 43 (1978), 313-340; T. Oakland, ed., *Psychological and Educational Assessment of Minority Children* (New York: Brunner/Mazel, 1977); and J. Salvia and J. E. Ysseldyke, *Assessment in Remedial and Special Education* (Boston: Houghton Mifflin Company, 1978).

Chapter 2 discusses screening and emphasizes that screening tests are designed to locate those within a group who require more intensive assessment. This chapter also gives a general description of administration, scoring and interpretation procedures. Klein emphasizes the importance of an optimal assessment climate, the establishment of which requires a skilled administrator. He stresses the necessity of looking beyond actual scores to the child's problem solving approach in given test situations. Parents who read this chapter will be unwilling to settle for reports that include only scores, statistics, and classifications. Klein directs parents' attention to the importance of their children's actual performances on given tests, and alerts them to the significance of comprehensive evaluations of the children's approaches to the various tasks in assessment reports.

Chapters 3 and 4 offer clear though brief descriptions of the development of intelligence testing. The terms "mental age" and "intelligence quotient" are clarified for the reader and are appropriately presented as concepts rather than as proven entities. One obvious omission from Klein's discussion of intelligence testing is the distinction between tests of multiple abilities (e.g., the Wechsler intelligence tests) and single ability tests (e.g., picture vocabulary tests or draw-a-person) as measures of "intelligence." Parents should be informed that the domain of behaviors sampled by multiple ability tests is much broader, although perhaps lacking the depth, than single domain tests; the results of the two types of tests should not be expected to yield comparable scores. Indeed, the results of any test indicate only the child's functioning on that test and on the range of behaviors it samples.[2]

Chapter 5 delineates criteria for choosing an intelligence test and presents the terminology used in describing the distribution of scores on the two most widely used individual intelligence tests. An important addition to this chapter would have been a section on measurement error. Test consumers ought to be aware that a certain degree of error will be present in any measurement procedure. Test scores should be reported within an error band, a particularly important consideration for scores close to cut-off points. This might also have been the appropriate place to caution parents about the inadequacy of intelligence tests as accurate predictors of school performance for individual children. While IQ tests may have predictive validity for large groups, individual scores fluctuate to such an extent that predictions about future school performance based on them should be made cautiously.

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[2] For elaboration of this point, see J. Salvia and J. E. Ysseldyke, *op. cit.*

Chapters 6 and 7 deal with personality testing, individual differences, and the child in interaction with her or his environment. These chapters help balance the discussion. Klein's assertion, however, that personality tests can be useful in helping children and parents plan ways to enhance their relationships with each other is an oversimplification. While such tests can be used to rule out or help establish instances of primary psychopathology, it is less than obvious how they can help parents plan better relationships with their children. More appropriately, projective and personality tests can yield results that suggest to the clinician that intervention or referral for psychotherapy is in order.

Brain injury and brain functioning are the topics of Chapters 8 and 9. Klein presents some of the assumptions behind the use of specialized tests. Developmental principles are discussed and special ability tests are presented within the context of storage, integration and retrieval. He warns that current knowledge about brain functioning is far from definitive and that the diagnosis of brain dysfunction should not, indeed *cannot*, be made on the basis of psychological tests alone.

The final chapter outlines the questions that are best answered by aptitude, achievement and interest tests. Standardization and scoring procedures are briefly presented. Unfortunately, the issue of standardization is inadequately treated both in this chapter and in the entire volume. The need to match the general background experiences of the child being tested to the population on which the test was standardized, not only in the case of achievement tests but for all tests, should be emphasized. Many tests currently in use were originally standardized on limited population samples. This is especially true for tests used to infer brain dysfunction or learning disability.[3] Other of the tests in use were standardized years ago and are out of date.

It is unclear whether the articles presented in this book were re-edited for publication in book form or reprinted as they originally appeared. The disjointed and repetitive tone of some portions of the book may be due to the latter. Despite these shortcomings, *Psychological Testing of Children* presents a worthwhile effort to bring some light to parents who have for the most part been in the dark where assessment of their children's abilities, personalities and development was concerned.

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[3] See G. S. Coles, *op. cit.*, and J. Salvia and J. E. Ysseldyke, *op. cit.*

Psychological assessments are conducted for many different reasons. Each time the referral question varies, the tests appropriate for answering the question will vary. Moreover, the child brings unique conditions to the assessment which will influence test selection. The tenor of Klein's book suggests that psychological assessment is a defined process that has meaning by itself. I would suggest, however, that psychological assessment should be viewed within the context of the referral question and the use to be made of the assessment's results. A battery designed to determine special class placement would be different from one designed to determine whether a child needs psychotherapy, and that battery might differ from one designed to investigate questions of special help in specific subjects. Parents should insist that referral questions be explicitly posed. They have the right to know what the findings will be used for, how the results are expected to clarify the problems the child is having, and how the tests will be used to help circumvent those difficulties. Not all of these issues are directly addressed in this book, but the discussions offer a starting point for parents who wish to become informed about basic aspects of psychological assessment.

Cynthia Rankin Hall
Learning Disorders Unit
Massachusetts General Hospital, Boston

Children's Learning and Attention Problems, by Marcel Kinsbourne and Paula J. Caplan. 1979. Boston: Little, Brown and Company. 300 pp. $15.00.

The stated purpose of the authors in this publication is to provide a practical guide for physicians and other professionals involved in the assessment and management of school-age children with problems of learning and attention. Their discussion is of "...children of at least average intelligence who are offered a traditionally adequate educational experience, but who nevertheless fail to learn at the expected level in one or more subjects" (p.3), and they attribute the learning failure to "maladaptive selection" or "inadequate processing" or both.

Under the rubric of *minimal brain damage* or *cerebral dysfunction,* Kinsbourne and Caplan use two main categories, *cognitive power disorders* and *cognitive style disorders* with which to encompass some of the more commonly used descriptive terminology for learning disorders as, for example, *dyslexia* and *dyscalculia* in the first category and *hyperactivity* and *hyperkinesis* in the second. They emphasize the importance of distinguishing between these two categories, in cases of school failure attributable to learning disability, so that learning needs will be met appropriately. While emphasizing a lack of common etiology, Kinsbourne and Caplan believe that *cognitive power disorders* result from selective developmental lag that ". . .can derive either from an individual variation in genetic programming or from early damage to an area of the brain destined subsequently to control the behavior in question" (pp. 8-9). *Cognitive style disorders* fall into two main groups: overfocused or compulsive; and underfocused or impulsive and distractible.

Kinsbourne and Caplan believe it is not possible to make a distinction between *constitutional dyslexia* (i.e., attributable to heredity) and *minimal brain dysfunction* (i.e., attributable to early brain damage) and, therefore, a diagnosis based upon etiology cannot be made and would be "useless in practice" (p. 49). This view seems to disregard recent advances in the brain sciences that offer evidence of variations of neuroanatomical structures in distinct percentages of the population and of hemispheric specialization in cognitive functions that may be varied among individuals. Thus, a genetic basis for developmental dyslexia cannot be easily discounted nor can the condition be attributed solely to early brain damage. It is important to keep in view what is now at least a high probability of genetic variation in individuals for whom traditional educational experience may be unsuitable. Otherwise, there can be little hope of overcoming the view, sometimes less than overt but nevertheless held, that a learning problem is always the result of a brain deficit or dysfunction.

That Kinsbourne and Caplan are aware of the powerful effect of labels is clear. "Our own categories of cognitive power disorder and cognitive style disorder, though they accurately classify children with brain-based school problems, still refer to subgroups that are heterogeneous; these terms require further analysis and are subject to misinterpretation by others. They do not need to be used in interpretations presented to parents, children, or educators" (p. 160). They advocate that in the place of diagnostic terms, one need only describe the child's area of difficulty, indicate what is difficult for the child, and explain how the child might be helped.

Kinsbourne and Caplan go into considerable detail on the diagnostic process which includes interviewing, history-taking, physical examination and psychological testing. Following this, they outline some general strategies for remediation with discussion of various kinds of schools and classrooms, classroom structures, and teaching strategies. They cite some reading, writing and arithmetic programs, among them what they refer to as the "*Gillingham* technique [which] professes adherence to Samuel Orton's now outdated ideas on the relation between reading acquisition and cerebral dominance; but in fact it is a rigidly systematic phonics approach which also takes advantage of multimodal drilling similar to that of the Fernald method" (pp. 193-194). The reference to this "technique" is not untypical of the references to remedial "programs" and betrays the authors' lack of first-hand familiarity with the approaches they cite. This is a problem they share with other physicians and psychologists who must advocate means for remediation that they themselves lack the opportunity to practice and learn about.

Children's Learning and Attention Problems includes an extensive discussion of what Kinsbourne and Caplan term "cognitive style" disorders—extremes of impulsivity, ranging from an "extremely impulsive-distractible temperament" through normal "flexibly adaptive behavior" to a "decision-making strategy that is so prolonged and deliberate that it hampers the handling of moment-to-moment changes in a situation" (p. 267). Differential diagnosis, management, and prognosis are all covered along with considerable coverage of the research on hyperactivity.

Kinsbourne and Caplan make no predictions about outcomes for children with learning disabilities but emphasize their own view that outcome is dependent upon the nature of the disability, its severity, the age at which it is recognized, and the age at which effective treatment is begun. They express some pessimism about certain cases of hyperactivity, an area of investigation that has received a considerable amount of their attention.

—Alice Ansara

Research Within Reach: A Research-Guided Response to Concerns of Reading Educators, by Phyllis Weaver with Fredi Shonkoff. 1978. St. Louis, Missouri: Research and Development Service, CEMREL. 134 pp.

This publication is a response to questions about reading that teachers, supervisors, and administrators want answered. Its purpose is two-fold: 1) to give teachers and administrators guidance in making their day-to-day decisions along with an understanding of how research can contribute to the improvement of their practice; and 2) to give researchers a picture of what practitioners need to know and what the state of knowledge about reading is currently.

The book covers five broad areas: the nature of reading and its instruction; reading readiness; developing reading skill, i.e., the early stages of reading; reading comprehension; and difficulties in developing reading skill. Through a very clearly organized format of question, discussion, summary, and suggestions for readings, the authors cover 22 topics within the five areas and, whenever possible, present conclusions drawn from research. Where research does not seem to provide conclusive answers, they state this clearly. Where there is debate, they identify the major positions taken, and when warranted, they make a recommendation for practice.

Topics range from the debate on *subskill* versus *holistic* approaches to beginning reading (the authors believe subskills are important in learning to read and useful to skilled readers when they encounter difficulty in a text) to the nature of reading comprehension (the authors think that teaching good component skills and having students develop their own questioning abilities will lead to improved comprehension). Between beginning reading and the more mature reading of elementary school pupils, a number of distinct areas (e.g., phonics, syllabication, whole word approach, language experience approach, visual training, etc.) receive thoughtful discussion.

Given the steady proliferation of instructional reading materials that enter the market annually, those who are responsible for establishing or revising reading programs in the elementary schools are faced with a bewildering array of claims made for the efficacy of one mode of instruction or another. *Research Within Reach* provides a good antidote to the contagious fever of the market place. By using the combined research and common sense answers provided by Weaver and Shonkoff for the most pertinent questions about reading acquisition and development, the thoughtful buyer can make sober judgments about a proposed instructional system in reading for the elementary classroom.

Weaver and Shonkoff do not address, except peripherally, the questions educators raise, or should raise, about reading instruction for dyslexic and other learning-disabled children. One cannot find fault with this since *Research Within Reach* is designed to deal with regular classroom instruction. It is to be hoped, however, that a similar effort will be made to identify the questions that are pertinent to this area of special education and that a research-based response will be forthcoming.

—Alice Ansara

Reversals: A Personal Account of Victory Over Dyslexia, by Eileen Simpson. 1979. Boston: Houghton Mifflin Company. 246 pp. $8.95.

Perhaps the most important message of this book by a psychotherapist, who has worked with dyslexic children and is also a professional writer is summarized in its final sentences. The author concludes her personal account of her victory over the printed word with this statement: "With what is now known about the reading process, there is little excuse for allowing a child to fail in school, and possibly throughout life, because of dyslexia. Such a failure is not only the child's. It is also society's."

Eileen Simpson's story of her struggle through her early school years and her final triumph over the printed page will evoke responses of sympathy and admiration from her readers. It will bring to them the realization that "dyslexia" is not merely a theoretical framework for discussion but a condition that can be a severe affliction and a source of bewilderment to an affected child. Few individuals surmount that affliction or understand it on their own.

The fact that Eileen Simpson's dyslexia is self-diagnosed (she first heard about it from the man she would soon marry and then learned more about dyslexia only much later during clinical practice with a psychiatrist) does not detract from the poignancy of her autobiographical account. Furthermore, whatever the cause of her childhood difficulties, she makes it clear that the effort to overcome a handicap—any handicap—is worthwhile.

Margaret Rawson, in her carefully documented study of the adult accomplishments of dyslexic boys[1], demonstrated that an early-life handicap need not lead to a crippled adulthood. Although Mrs. Simpson's highly personal narrative does not—perhaps cannot—have similar documentation, it nevertheless serves the same purpose. No reader can fail to agree with the author's view that society must bear the responsibility for school failure. That society, and not the child alone, must *assume* the burden, is implicit in that view.

—Alice Ansara

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[1] Margaret B. Rawson, *Developmental Language Disability: Adult Accomplishments of Dyslexic Boys* (Baltimore: The Johns Hopkins Press, 1968, and Cambridge, Massachusetts: Educators Publishing Service, 1978).

The Rights of Parents and the Responsibilities of Schools, compiled by James G. Meade. 1978. Cambridge, Massachusetts: Educators Publishing Service. 186 pp. $6.00.

This book includes the complete texts, their amendments to the date of this publication, and the policy interpretations published in the *Federal Register* through August 14, 1978, of two important laws related to the education of handicapped children. They are Public Law 94-142, the Education for All Handicapped Children Act, and Section 504 of Public Law 93-112, the Non-Discrimination on the Basis of Handicap Act. An understanding of the provisions of these laws and the mandatory requirements for their implementation is of great importance to all those concerned with dyslexic or otherwise learning-disabled children and adolescents.

James Meade has performed a valuable service for both parents and educators by extracting the most pertinent sections of the laws for interpretation and implementation and clearly identifying them for easier reading and understanding than would otherwise be possible through an initial reading of the entire laws. Particularly helpful is an outline of eight steps for parents to follow in ensuring that their children obtain the educational assistance to which they are entitled. Another section deals with questions that teachers most frequently ask about the laws.

Margarent Rawson has contributed a chapter in which, through a question and answer format, she clarifies a number of frequently confused notions about dyslexia. The questions, ranging from such basic ones as, "What is dyslexia?" to others more practical, such as what parents and teachers can do about it and how dyslexic children can learn, are answered with both clarity and brevity.

Meade has also provided valuable reference lists, some of them with annotations to help the reader select an appropriate reference. Other references speak for themselves through their titles. References include: national legal, advocacy and service organizations; state and local information and advocacy groups throughout the nation; national organizations for the handicapped; the special education departments of the various state boards of education; the regional offices for civil rights of the Department of Health, Education and Welfare; and the addresses of the Bureau of Education for the Handicapped, and Closer Look. The Bureau of the Handicapped, part of the Office of Education, is the agency directly responsible for administering PL 94-142, and Closer Look is a primary information center.

In addition, Meade has provided information on two national organizations of interest to parents and teachers of children with dyslexia or other learning disabilities, The Orton Society and the Association for Children with Learning Disabilities. He gives the branches throughout the country for the first and the state and local affiliates for the latter. Selected readings are provided for parents and teachers.

The Rights of Parents and the Responsibilities of Schools is an important publication for parents who have to find their way through what is sometimes a frustrating maze of school bureaucracy before they can find adequate help for their children. It is an excellent handbook for teachers and psychologists in clinics and schools as well as for administrators who have the responsibility, under the law, for full implementation of PL 94-142 and PL 93-112.

—Alice Ansara

Dyslexia: An Appraisal of Current Knowledge, edited by Arthur L. Benton and David Pearl. 1978. New York: Oxford University Press. 544 pp. $22.50.

Arthur Benton and David Pearl, in this important volume, provide a welcome landmark in the nearly century-long voyage toward understanding and acceptance of developmental dyslexia as more than mere hypothesis. Long debated, its precise nature still questioned, its etiology still uncertain, the existence of developmental dyslexia is nevertheless acknowledged, albeit reluctantly by some, as new avenues of investigation continue to open. *Dyslexia: An Appraisal of Current Knowledge* lives up to its title and provides a healthy debate about the issues in these investigations.

The chapters in this book were written for a research conference planned and sponsored by the National Institute of Mental Health (NIMH) and held in March of 1977. The conference itself was the outgrowth of an earlier workshop convened to advise NIMH on the current status of theory and research on dyslexia, the next steps of research and development, and the specific role that NIMH should play in these activities. This volume addresses the first of these purposes and provides a broad coverage of important areas of recent research. Drawn from a number of disciplines, the 27 contributors cover seven major areas of investigation into dyslexia: nature and prevalence; psychological factors; neurobiological research; electroencephalographic and neurophysiological studies; genetic factors; early detection and preventive intervention; and remediation. An extensive bibliography adds to the value of this book.

Michael Rutter, well-known for his large-scale studies of reading difficulties in school populations in London and the Isle of Wight, raises a number of issues that he believes must be resolved before there can be a definitive statement about the nature and prevalence of dyslexia. In this he is echoed, though with some variation, by others. In support of his thesis, Rutter cites different causes of reading difficulties, conflicting criteria for diagnosis of dyslexia, lack of an operational definition; problems of differentiation of syndromes of reading backwardness in general in the attempt to achieve identification of a dyslexic population as a distinct subgroup; and, finally, the methods of measurement. Despite his many caveats, Rutter concludes—and here, too, is echoed by other contributors—that the dyslexia hypothesis is "both plausible and important" and worthy of further investigation. Rutter advocates "better-defined study populations than those often used in the past" and the use of "regression techniques rather than the now-discredited achievement ratios" (p. 27). Rutter also calls for genetic studies of biological and behavioral markers of reading disorders in individual families and better investigation of spelling retardation. The investigation of spelling retardation, along with reading retardation in the study of dyslexia, may be fruitful, according to Rutter, because the disorder, especially in adolescents and adults, may be evident only in spelling difficulties. Finally, Rutter suggests that, in addition to research into the possibility of the distinct condition of dyslexia, "there should also be research into the possibility that there is no separate condition, but rather multifactorial influences and quantitative variations in biologically determined characteristics" (p. 28).

Leon Eisenberg, in another chapter, supports Rutter's position on the lack of an operational definition of dyslexia and is equally critical of the wording of the definition provided by the World Federation of Neurology, but unlike Rutter, he remains convinced as a clinician that there *is* a disorder—or group of disorders—that does indeed correspond to this definition. He believes that there is "a category of patients who fail to read in the absence of any of the ordinary causes for poor reading" (p. 31). Eisenberg justifies his stance by drawing an analogy from the history of medicine, citing the "efforts to separate out from a larger set of patients with common symptoms a subset who differ sufficiently from the others to suggest that a different entity is present" (p. 31). Eisenberg describes the process that takes place over decades until, despite earlier disagreement on the diagnosis, there is a definition of a disease in terms of its underlying pathology and new and variant clinical forms can be identified.

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With a brief sketch of the history of research on thalassemia, Eisenberg offers a paradigm "for untangling the intertwined syndromes of dyslexia" (p. 33). He traces the research on that disease from its first separation out from a group of childhood anemias in 1925, through the transition from clinical to laboratory criteria for definition, to its current definition. Noted by investigators in 1932 as a disease in children who came from families of Mediterranean origin, by 1940 the genetic basis of thalassemia was established. Further research on the disease itself and a factor associated with it led to the "recognition of some fifty combinations of genetic errors which can produce the clinical picture of thalassemia" (p. 32).

The example of thalassemia leads Eisenberg to state, "In our study of reading disorders, we are still trying to characterize the equivalent of Cooley's [1925] anemia (dyslexia) in the midst of cases of Von Jaksch's [childhood] anemia (retarded reading). The thalassemia variants lie ahead in the future" (p. 33). This discussion provides the basis for Eisenberg's suggestion that a search for biological indices might permit the isolation of a Mendalian "disease" within the "heterogeneous group of reading disabilities." Eisenberg advocates "continuing the search for pathophysiological mechanisms underlying the several syndromes of reading failure" but abondoning the "logical circularities in the existing definitions of dyslexia" (p. 41). This should be carried out in a way that will not, however, interfere with services that children need.

Steven Mattis contributes the final chapter in the section on the nature and prevalence of dyslexia. Referring to Rutter's conclusion that dyslexia does not refer to a well-defined group of disorders, Mattis expresses disappointment in view of "intensive investigation" over a 40 to 50 year period, and he attributes the failure of past research into dyslexia to underlying hypotheses that were not useful. He believes, however, that a reasonable working hypothesis can be derived in part "from the adult alexia literature which somewhat redefines the criteria for identifying types of dyslexia" (p. 46). Mattis suggests that the clinical reality in adults, where there is no "single causal defect underlying all alexias but rather several independent causal deficits. . .is the basis of a model of dyslexia in children which. . .is a reasonable one to pursue at this point in our current understanding of the literature on children's dyslexia" (p. 46).

In developing his working hypothesis for a definition of dyslexia, Mattis brings up a recurring theme of this volume: the existence of *types* of dyslexia, each one distinctive in characteristics and antecedents. Mattis cites his own studies (with French and Rapin) through which he defined three dyslexia syndromes (language disorder, articulatory and graphomotor dyscoordination, and visuospatial perceptual disorder), as well as other studies (including his more recent cross-validation study) to reiterate the existence of independent dyslexia syndromes. To the three syndromes that he has proposed, he adds the "sequencing disorder" observed by Martha Denckla.

Arthur Benton, in his summary statement, agrees with Mattis that "what is known about acquired disorders of reading in patients with brain diseases can serve as one (not necessarily the only) useful model for achieving further understanding of developmental reading disability" and that "it is likely that utilization of the same models for the study of the developmental and acquired alexias will advance understanding in both areas" (p. 464). Benton's statement and Mattis's proposal for a "working hypothesis" are strongly reminiscent of Orton's more than 40 years ago. Orton suggested that from the medical literature on acquired language disorders in adults and from experience in the clinic and laboratory, "we may select some facts which are believed to be of importance in understanding the obstacles which are encountered by certain children in gaining a normal mastery of spoken and written language."[1] It was also Orton who pointed to a cluster of syndromes, rather than a single, unitary one, and described types of specific language disorders associated with the cluster of syndromes, each with distinctive characteristics.[2] They encompass those described by Mattis.

It seems to this reviewer that the time has come to end the debate over the *existence* of dyslexia (or a group of dyslexias) and to focus instead upon the clinical and laboratory evidence that could lead to the discovery of its etiology (or etiologies). Each hypothesis should be tested against clinical and laboratory evidence rather than constantly supplanted by "new" hypotheses that restate the old or merely add fuel to the debate. We may then be able to discover—or perhaps I should say agree upon—both the nature and prevalence of developmental dyslexia. We may even find our "thalassemia" and its variants.

Frank R. Vellutino provides a review of a number of hypotheses and theories of dyslexia, from Orton's first proposals in 1925 to those of recent investigators, and cites considerable research. He discusses the various hypotheses and investigations and places them in four broad categories:

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[1] Samuel T. Orton, *Reading, Writing and Speech Problems in Children* (New York: W. W. Norton and Company, 1937, pp. 25-26).

[2] *op. cit.* Orton's categories are: developmental alexia (reading disability); developmental agraphia (special writing disability); developmental word deafness; developmental motor aphasia (motor speech delay); developmental apraxia (abnormal clumsiness); stuttering in childhood; and combined or mixed syndromes.

deficiences in visual perception; dysfunction in intersensory integration; dysfunction in temporal-order recall; and dysfunction in verbal processing. Despite the excellence of his extensive review of the literature, it is difficult to accept Vellutino's rejection of some hypotheses in favor of one alone, i.e., the verbal deficit hypothesis, however much there is to commend it. For example, his review of the studies evaluating perceptual-deficit explanations, which include memory deficits, suggests to him "that support for such explanations, is at best tenuous" (pp. 85-86). He cites the poor methodological and control problems of investigations in this area and none would disagree with him. But is the solution to such problems the discarding of the hypothesis or a more rigorously scientific approach in it investigation?

The problems of investigation are indeed complex, as Vellutino states, because of the many variables, both intrinsic and extrinsic, that affect retarded readers. Furthermore, as Vellutino points out, reading requires the "economical and efficient use of all of the child's cognitive skills" (p.111). To deal with some aspects of the variables, Marion Blank suggests that, rather than place reliance upon the exclusionary criteria as set forth by Vellutino, "a broad array of reading difficulties could be studied" and "wherever possible, a comparably handicapped group that is not retarded in reading ability should be included in the research" (p. 117). Blank offers the second of these two approaches as a safeguard against drawing conclusions about deficits that may not be relevant to the performance on a particular skill.

Blank identifies two main approaches by investigators, one which focuses on identifying defective skills in dyslexics and the other which focuses on the demands of the reading task itself. Acknowledging the potential difficulties of both of these approaches, she gives evidence for her belief that "a model focused on the precise demands of the reading task is more fruitful than a model focused on what is defective in readers" (p.119).

Although Blank concurs with Vellutino in the main that the major difficulties for retarded readers lie in the sphere of language, she believes that the *way* in which the emphasis on language is presented may lead to neglect of other, important factors and may leave segments of the dyslexic population (subgroups with deficiencies in other areas) undiagnosed. She is critical also of Vellutino's dismissal of visual information processing and temporal sequencing as factors in dyslexia and suggests that such difficulties may be a *corollary* of language problems in the dyslexic child. It is not necessarily a question of one *or* the other and it is important to keep open still undecided issues.

Blank raises two important issues related to the relationship between language skills and reading ability overlooked by Vellutino and other investigators of that relationship. The first is metalinguistics, the use of language to deal with language. "A significant feature of metalinguistic tasks is that they demand a type of reflection that is rarely demanded in other language tasks. . .there must be a conscious effort to refocus our attention to different aspects of the verbal material. . .reading seems to require similar sorts of skills" (p.121). The other is the language used in communication between teacher and child. Citing the ability of children to learn skills in a special educational setting that they have failed to learn in the regular classroom setting, Blank suggests that there may be factors that facilitate teacher-child communication and that they are worthy of investigation.

The chapter contributed by Donald G. Doehring is appropriately entitled, "The Tangled Web of Behavioral Research on Developmental Dyslexia." From the beginning he makes clear how tangled it is indeed by commenting that "Vellutino's paper represents a heroic effort to critically appraise the results of studies conducted in an attempt to discover the true behavioral nature of developmental dyslexia," and then by concluding that "Vellutino's conscientious attempt to rationalize his own theoretical position with a study-by-study analysis of the literature illustrates the chaotic state of the art of behavioral research related to dyslexia" (p.125). Systematically, from then on, he attempts to separate the filaments that make up the "tangled web" and briefly discusses them: the single-syndrome paradigm; the definition of dyslexics as "otherwise normal"; the definition of dyslexia by a single measure of reading; dyslexia as a unitary disorder; problems of causality, etc.

Doehring suggests that there should be active exploration of alternatives to the single-syndrome paradigm and he offers additional paradigms. Nevertheless, he concludes that "There is little chance that final answers to the problem of dyslexia will be found in the near future, considering the continuing uncertainty about the operational definition and the theoretical status of reading, attention, perception, memory, cognition, language, and intelligence. Advances in our knowledge of dyslexia will probably occur not in the form of dramatic discoveries with a simple paradigm but through a patient working and reworking of complex sets of experimental variables, with clinical validation wherever possible" (pp. 133-134).

As Byron P. Rourke demonstrates, the neuropsychologists in fact have undertaken the task of working through complex sets of variables. From the large body of literature on the neuropsychology of reading retardation, Rourke has succeeded admirably in selecting for discussion

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the research results which, in his view, have clear theoretical and/or clinical significance. Studies encompass those in prenatal, perinatal and neonatal abnormalities; finger agnosia and right-left discrimination; choreiform syndrome, minimal brain dysfunction, and the neurological examination; electroencephalographic abnormalities; oculomotor, visuomotor, visual-perceptual, and visuospatial factors; temporal sequencing and serial positioning; auditory-visual integration; cerebral dominance; dichotic listening, vision and tactile perception; and neurolinguistic abilities.

For each topic, Rourke cites, briefly discusses, and evaluates the research. While he discounts the value of some areas of research, he views others as promising. Thus, for example, he dismisses on the basis of little evidence the possibility that oculomotor factors play a role in reading retardation but cautiously states that visual-perceptual and visuospatial factors may be somewhat more important. The area of research that receives Rourke's greatest attention and criticism is Orton's proposal that there is a relationship between cerebral dominance and specific reading disability, and he reviews a number of lines of investigation that stem from this proposal. Citing studies that involve dichotic listening, vision, and tactile perception, he finds inconsistencies but, nevertheless, sees promise among them.

Rourke identifies three principal strategies used in the neuropsychological investigations of reading retardation in children. They are: comparison between normal and retarded readers on tests sensitive to the integrity of cerebral hemispheres; comparison of retarded and normal readers on specific tasks that might reveal deficiencies in abilities underlying those tasks; and classification of subgroups in specific reading disorders. Each strategy, according to Rourke, has problems and limitations.

Otfried Spreen extends Rourke's discussion of the neurobehavioral approach to dyslexia and concludes that it "is an ambitious one, since it implies that we are not only searching for correlates, accompanying deficits, and early signs for identification, but also that models for the underlying brain mechanism of reading failure are proposed. Such models need not imply etiology, but should be sufficiently far-reaching to have explanatory power for at least one of the major forms of dyslexia" (p.194).

A proposal for another direction for neurobehavioral research is the main theme of Robert M. Knights. Knights believes that "reading retardation is not understood [because] the nature of this problem itself has not been carefully observed and documented" and that instead the concern has been too much "with the correlates of reading retardation" (p.198). He suggests that careful observation of the child and a thorough examination of the "ontogeny of the reading process" would be fruitful. This kind of research should focus on the development and acquisition of reading skills in normal children and include an examination of both experiential and constitutional factors that influence acquisition of the reading skills.

Differences among investigators of dyslexia are revealed in still another section of this volume. Part four of the book groups together neurophysiological and electroencephalographic studies, and John R. Hughes reviews the wide range of approaches in electroencephalographic research. At the outset, however, he states, "The usefulness of the electroencephalogram in studying children with dyslexia and other learning disabilities has been controversial" (p.207). Hughes cites imprecise definitions of groups under study; overlapping, questionable EEG findings in many of the children; and a relatively high incidence of "abnormal" EEG findings in control groups. Nevertheless, he states that there is clear evidence of statistically significant difference between control and dyslexic groups in a number of studies. On the basis of his review of electrophysiological findings in dyslexia, Hughes concludes that the "results from most of the studies are sufficiently encouraging to justify further investigation in nearly all areas that have been previously explored" (p.236). He believes, however, that priorities should be established in planning the order of the studies to be undertaken.

Martha B. Denckla and C. Keith Connors, in separate chapters, give critical reviews of the discussion by Hughes. Denckla's main concern is the question of "EEG correlates of *what*" and, like so many contributors to this volume, she raises the issue of definition of dyslexia. "It is indeed difficult to make sense out of the different and/or apparently conflicting reports of any correlate (not only an EEG correlate) of dyslexia unless the reports address the issue of definition of 'dyslexia' " (p. 243). Denckla reviews the problems of defining "normal" as opposed to what is thought of as abnormal and she emphasizes the need for the accumulation of normative data. She also offers caveats for methodological considerations for test conditions and statistical analyses. In commenting upon the review of studies of cerebral dominance by Hughes, Denckla makes clear her view that he "has understated the contribution to this dynamic issue of [the] studies cited in previous sections of his review" (p.248).

Connors takes an unequivocal position with his statement that "the clinical EEG has *not* been established as a correlate of dyslexia" but he then qualifies this by stating that "certain more recent computerized analyses of the EEG tracing do show promise of important association" (p.253). Citing methodological flaws in the studies reviewed by Hughes, Connors lists ten areas in support of his own interpretation of the studies. Despite the methodological problems in studies so far, he believes that "electrocortical measures are capable of isolating processes involved in reading" (p.261) and anticipates that further studies will provide insight into the pathophysiology of dyslexia.

Freya W. Owen, in her discussion of the genetic aspects of dyslexia, refers to her own familial studies of learning disabilities, the twin studies by Hermann, Hallgren and Norrie, and the recent familial study of specific reading disability by Finucci and her colleagues. Owens raises questions with regard to the implications of such genetic studies and suggests that there may be transmission of dyslexia through multifactorial inheritance, i.e., if it is determined by "a large number of genes, each contributing a small amount to the trait" then there would be an interaction between genetic predisposition and environmental experience.

In his review of Owen's chapter, Gerald E. McClearn has a more positive view of genetic studies and states, "There are bountiful data attesting to the familial nature of the disorder and strong presumptive evidence that this familial distribution is due at least in part to genetic factors, although assessment of specific hypotheses concerning modes of inheritance has been confusing and inconclusive" (p.287). Despite McClearn's reference to "bountiful data," this reviewer was struck by the paucity in the number of studies cited by Owen, especially in view of the fact that this volume as a whole contains close to 1000 references cited for other areas of investigation into dyslexia. Clearly, then, if this "state of the art" publication is to be taken as a measure, the possibility of a genetic factor in dyslexia has not gained the attention of many investigators. This is remarkable indeed when we note that speculations about such a possibility occurred as early as 1905, when it was proposed by C. J. Thomas, and 1930, when Orton offered his observations.

The importance of a search for genetic factors is demonstrated by McClearn in his citing of the research that resulted in the discovery of genetic factors in phenylketonuria and Down's syndrome, two subtypes of mental retardation. McClearn notes that these two examples inspired research leading to a view of mental retardation "as a complex class of phenotypes, consisting of many different disorders with distinct etiologies" (p. 295). He likens today's research on the genetics of reading disability to the state of research in mental retardation prior to the breakthrough of 1934 which led to identification of the subtype associated with phenylketonuria. McClearn concludes that research, as the first order of business, should be directed toward differential diagnosis of reading disability.

Barton Childs, Joan M. Finucci and Malcolm S. Preston, in their joint contribution to this volume, argue against Owen's approach to the question of genetic influences in dyslexia, and they characterize it as "a modification of the conventional genetics method which tests the degree to which some quality is genetically determined, but is not concerned with the properties of each individual in the population" (p. 301). Childs and his colleagues propose the alternative method of medical genetics where the individual is the primary focus, rather than the statistical differences between groups, and "the origins of the variance for the normal range of measurements of skills whose biological basis is unknown and immeasurable" are not of interest (pp. 302-3). With regard to specific reading *disability*, however, the medical geneticist *is* interested in the identification of the discrete, measurable biological qualities that affect the capacity to learn to read.

After further discussion of some of the issues raised for genetic research, Childs, Finucci and Preston conclude that "it is not possible at the moment to state unequivocally whether specific reading disability is genetically determined or not, or whether some cases are and others are associated with something else, or whether if there is some genetic element in some cases it consists of genes at one locus or at many" (p.309). They advocate rigorous tests of the various hypotheses directed to the distinction of the characteristics of individuals.

In the chapter on early detection and preventive intervention, Paul Satz and his colleagues, H. Gerry Taylor, Janette Friel and Jack M. Fletcher, devote most of their discussion to Satz's six-year predictive studies. The justification for basing so much of this chapter upon the research of its principal author is the view they express about other studies. Satz and his colleagues believe serious methodological problems and lack of theoretical framework have hampered earlier research and, therefore, their own more current project is the only one to date that has fulfilled some of the minimal requirements. They do acknowledge, however, "that much of the conceptualization underlying [their] current project evolved from the landmark contributions of two earlier longitudinal studies," those of de Hirsch and Jansky and of Silver and Hagin (p.319). In view of the extensive and frequent reporting of the Satz study during its progress, I will not here attempt to summarize its findings but turn instead to some of the discussion of the issues in prediction and intervention that follow this chapter.

The stated purpose of Archie A. Silver's discussion is to "put Satz's work in clearer perspective, particularly in light of the work which preceded his own and that which is proceeding currently" (p. 351). In this attempt, Silver presents five important questions for consideration. They are: "(1) What efforts have been made toward the primary prevention of reading failure? (2) What are the ideal characteristics of a scanning instrument for secondary prevention? (3) What should be included in a predictive battery? (4) What do readiness and scanning tests measure? (5) Can children at risk for reading failure be detected earlier than kindergarten?" (p. 352).

Silver makes the important distinction between *primary* prevention, which would involve broad social and educational planning to encompass perinatal factors and modification of environmental factors during the first three years of the child's life; and *secondary* prevention, which would be directed toward the detection of the precursors of reading failure *before* actual failure has occurred. He believes, however, that primary prevention will be possible of attainment only when there is understanding of *all* the factors that interact within the complex behavior of reading. For what he terms secondary prevention, Silver describes *scanning*, i.e., the surveying of entire populations, and *diagnosis*, i.e., the evaluation of children individually, and he discusses various tests and instruments used to predict vulnerability to reading failure in young children. Silver concludes that, despite the fact that what is measured by "readiness" tests and scanning instruments is unknown, they nevertheless do have modest predictive value. He cites, for example, the modest success of readiness tests of the kind for which Marion Monroe's 1935 program was the prototype and which are also based upon the practical judgment of the skills related to early reading. He contrasts to these the scanning tests which attempt to find the predictive antecedents to reading and are derived from theoretical models of beginning reading. Thus, each scanning battery places stress upon factors determined by the particular theoretical bias that underlies its construction.

According to Silver, "The data, so far, raise serious doubts about the applicability of some of these predictive instruments. A 75 percent 'hit rate' really means that one child in four is misclassified. . .A test which does not identify 42 percent of severely retarded readers and misses 80 percent of the mildly retarded readers cannot be used as the basis for educational decisions" (pp.375-6). Silver's thoughtful discussion of many aspects of prediction and ensuing intervention should be thoroughly studied by those who are responsible for such programs in the schools. Readers will also find helpful his inclusion of the 1975 analysis by Beecher and

Goldfluss of areas of functioning presumed to be tapped in the many readiness tests now published.

Jeannette J. Jansky chooses to discuss mainly the prediction of reading disabilities and the significance of the results for theory. She also comments, however, on the implications of prediction research for early intervention. Jansky uses Satz's predictive studies to illustrate a weakness in predictive batteries. The Satz tests predicted the extremes of ability (in children who later read very poorly and in those who later read very well) but the kindergarten predictors were less precise for the children between the extremes (those with mild reading failure or those with average ability). Furthermore, the "miss" proportion, when all of Satz's studies are combined, go well beyond tolerable limits. "The efficiency of the battery was not strong when put to the test of identifying failing readers over a five-year span" (p.391).

Jansky believes that no kindergarten test battery will predict *failing* readers in prospective samples at better than 75 percent, and she suggests that the reason, in part, is "that reading seems to be a complex, developmentally 'new' accomplishment that is more than and different from the learning that precedes it" (p.383). Noting the ability of kindergarten teachers to predict the performance of children they have had the opportunity to observe, Jansky recommends combining their ratings of children with test scores.

Like Silver, Jansky provides a thorough and highly thoughtful discussion of many aspects of prediction and intervention and of the factors that must be considered. Along with Silver, she provides a framework for practical considerations in the choice of current models available to educators planning programs of intervention. Jansky concludes her chapter with recommendations for a theoretical framework for prediction and for further research in both prediction and intervention.

The final section of this volume covers remedial approaches to dyslexia. Doris J. Johnson describes briefly the Orton-Gillingham approach, the Fernald approach, the Johnson-Mykebust approach, and the use of color phonics and modified alphabets. The findings regarding instruction and prognosis for dyslexics are inconclusive, according to Johnson, but she believes that further studies and programs are justified and she offers some recommendations for procedures for them.

John T. Guthrie is critical of Johnson for limiting her description of remedial approaches. He believes that there are many instructional strategies, such as those proposed by Spache or described in articles in *The Reading Teacher*. Guthrie cites instructional strategies based, for example, on "counseling, operant conditioning, perceptual deficits, peer tutoring, skill deficits, language deficits, learning styles, and audiovisual equipment" (p.425). He also cites methods proposed by various authors for teaching disabled readers—intersensory reading method; development of interpersonal relationships; programmed instruction; directed-reading-thinking activities; and one that provides "the synthesis of about seven available techniques."

After taking Johnson to task for citing too few "methods," Guthrie seizes upon one, the Orton-Gillingham approach, for his main attack. First, he states that the "appellation of Orton-Gillingham. . .is unfortunate since it implies that the method is unique [with] the implication [that] dyslexics require qualitatively different instruction from other children with subnormal reading, which is probably not the case" (p. 426). For his first point, he cites the use of the "alphabetic method" by the Greeks at the time of Plato, the Puritans in this country, contemporary Israeli teachers, and by teachers "working with many types of children" for whom it has "intuitive appeal." Since Guthrie believes that patterns of subgroups among disabled readers are not evident (although he allows that they may be delineated in the future), he advocates four principles of instruction applicable to all disabled readers: (1) the focus of instruction on the deficient cognitive components of reading; (2) instruction in all components of reading; (3) intensive interaction between instructor and student; and (4) maximal amount of instructional time. These are principles of sound pedagogy, whether applied to disabled readers or to "normal" readers, and they are already essential components of the approaches to the remediation of dyslexic children, the approaches that he misinterprets and attacks.

Guthrie clearly reveals his bias against the notion of dyslexia and of the approaches to remediation developed within the framework of the hypothesis of dyslexia. His superficial discussion of both betray an unwillingness to offer serious discussion based upon thorough investigation. This frivolous chapter is out of place in a volume otherwise devoted to sober appraisal of current knowledge of dyslexia by authors who, though they may differ in their interpretations, are serious in their purpose.

In contrast to Guthrie, Naomi Zigmond does differentiate among disabled readers. In her review of remedial readers, she has identified what she believes to be three categories of approaches used with "problem" readers. She believes individualized instruction is the most promising and should be the target for future research in order to "refine our capacity to

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match individual learner characteristics to the strategies, materials, content, and sequence of reading instruction" (p.447). On the other hand, she believes that what she characterizes as the "small group of true dyslexics" are "resistant" to reading instruction and for them, two other approaches are necessary. One is consultation with mainstream teachers and the other a "survival skills" curriculum.

The discussion of remediation for dyslexia (or a group of subtypes of dyslexia) in this volume underscores the urgent need for the study of remedial approaches and outcomes. Admittedly, given the large number of variables to be identified and controlled in any study, and given the lack of consensus on the nature of dyslexia, this is indeed a difficult task. Yet, given the general consensus that dyslexia is in fact a tenable hypothesis and the further fact that a distinct percentage of the population is resistant to various conventional approaches to reading instruction, the task must be undertaken. Eisenberg's suggestion for genetic research in dyslexia might serve as a model. He suggests categorizing an index case with some specificity and searching the family pedigree for members with similar reading errors in the effort to identify genetic inheritance. We might follow this model by categorizing the patterns of behavior in index cases along with categorizing the successful *and* unsuccessful patterns of instructional behaviors and the family, social and cultural conditions. Thus, we might begin to demonstrate *what* works *when,* with *whom,* and under *which conditions.* Research of this nature, carefully planned and controlled, might not only enhance our knowledge of treatment but might also contribute toward a firmer foundation in theory and diagnosis of dyslexia.

The conference, sponsored by the National Institute of Mental Health, that resulted in this volume is an important step toward addressing the problem of dyslexia and its consequences. This reviewer hopes that the issues identified by the contributors to this book and by its editors will be pursued vigorously and that NIMH will lend its full support to the effort to resolve the issues of definition, etiology, diagnosis, prevention and remediation of dyslexia.

—Alice Ansara

Progress in Learning Disabilities, Volume IV, Helmer R. Myklebust. 1978. New York: Grune and Stratton. 261 pp. $19.50.

This volume is the fourth in a series which began in 1968. The overall quality as well as the timeliness of most of the chapters is excellent. Several of the chapters in this volume provide excellent surveys within their topic areas; they would be helpful to readers concerned with the construction of research in the field of dyslexia.

In the first chapter, Myklebust emphasizes the need to subdivide the area of language investigation into those forms of language problems with a hallmark of written language underachievement and thus suggests a subspeciality of *dyslexiology*. From my standpoint, however, this would not mean casting aside the continuing investigation of the development of speech and oral language production and perception, but that the qualities of written language require special selective investigation and thus necessitate, as Myklebust suggests, working toward a science of dyslexiology. Mykelbust points out appropriately that such a science would approach both innate or congenital dyslexia, as well as those written language underachievements that are acquired. Furthermore, one must consider that the manifestation will vary with age, as well as cause, and thus such an investigation must cover a broad spectrum of age groups.

In his introductory chapter Myklebust discusses four forms of dyslexia; namely, (1) inner-language dyslexia, (2) auditory dyslexia, (3) visual dyslexia, and (4) intermodal dyslexia. In his discourse on meaning and inner-language, he notes that although the emphasis will be on verbal symbols, it is still pertinent to investigate nonverbal images as they are used representationally. In agreement with many others, he emphasizes the difficulty of symbolization and its cognitive processing from reception to expression as the principle element to be taken into consideration in both definition and treatment of dyslexia. Rightfully, he considers the problem of the more advanced reader who must take basic linguistic information and construct a representation of the information based on inference. This higher writtenlanguage characteristic is one demanded of high school and college students. All too often it is neglected both in assessment and remediation. Myklebust appropriately also recognizes the importance of the individual receiving the information when he quotes MacKay "...meaning is clearly a relationship between message and recipient, rather than a unique property of the message alone." In addition to this treatment of the question of abstraction and cognition, Myklebust recognizes the need of the reader to gain both concept formation and meaning from metaphor.

In agreement with my own view and with the majority of the membership of the Orton Society, Myklebust construes dyslexia as a language disorder. Appropriate attention is given to prestructured processes, specialization by hemisphere, and the prerequisites for reading. In those circumstances for which there is auditory deprivation, Myklebust suggests that verbal comprehension is not required, and the subsequent deficit in learning to read is not a dyslexia, but rather a receptive aphasia which secondarily affects learning to read. In differentiating dyslexia from non-language reading disabilities, Mykelbust emphasizes that it is a disorder in symbol-making behavior, as well as difficulty in using words representationally. He points out that failure on a reading test alone does not constitute a basis for diagnosis.

His own definition of childhood dyslexia is that of a "language disorder that precludes acquisition of meaning from written words because of a deficit in ability to symbolize. It may be endogenous or exogenous, congenital or acquired after birth. The limitations in reading language are demonstrated by discrepancy between expected and actual performance in reading. These limitations are derived from dysfunctions of the brain, manifested by disturbances in cognition. They are not attributable to sensory, motor, intellectual, or emotional impairment, nor to inadequate teaching or deprivation of opportunity." This definition then attempts to be a bit more specific than that provided by the World Federation of Neurology in 1968. He goes on to elaborate over the subtypes of dyslexia, as he intends to use them, indicating that the inner-language form of dyslexia, often referred to as word-calling, is the most severely handicapping form. Myklebust provides excellent reviews of the studies of auditory and visual processing as they relate to reading and of the difficulty in some children in the transferring of information from one sensory modality to another. Appropriately, he comments upon broadening the area of reading deficiency to include the realization that it is more than the receptive aspect of written language and the child with reading disability will have a writing disability as well.

In amplifying his call for the development of a science of dyslexiology, Myklebust reviews the various fields that have thus far been involved in touching base with various aspects of written language underperformance. He emphasizes the need for a systematic and cohesive bringing together of the attributes of each discipline. He calls attention to the fact that special education services, which are essential for remediation, suffer because many special educators have limited advanced training in dyslexia, in part perhaps, because of the small number of appropriate graduate courses offered by universities and colleges. Furthermore, he points out that those that do offer specialized degrees in reading disabilities rarely include the area of dyslexia.

As to the remedial approach, he suggests that assessment provides the means of planning remediation. The principles upon which remediation

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is predicated encompass the following concepts: (a) individualizing the problem; (b) input precedes output; (c) meaning must be taught; (d) initial process is phoneme to grapheme; (e) coding does not always result in attainment of meaning; and (f) the brain is prestructured to process information in systematic ways. Teaching materials and methods, therefore, must be patterned on the hierarchies that ensue; meaning results from symbolization which assumes relating symbols to what has been learned previously. In my view, this chapter by Myklebust is sound and my hope is that those in the educational establishment will respond to this prestigious individual's call for clarification of the basic issues in dyslexia.

The second chapter treats the genetic consideration in dyslexia and is written by Joan Finucci. This is the most comprehensive review of the genetics of written language underachievement that I have seen. Any reader interested in capturing the essence of the geneticist's attempt to trace the genetic characteristics of dyslexia should read this chapter. It is thoughtful, well organized, and contains an excellent review of the existing literature. The reader is left with the sense that there is a genetic component to most cases of dyslexia (as defined by Myklebust) and that continuing careful research, including sensitivity to subtypes of dyslexia, may better ferret out the means by which heredity presets the individual toward success or underachievement in a traditional learning environment. Some excellent suggestions are made with regard to the construct of studies in the future. Investigators wanting to consider hereditary factors would do well to read this chapter.

Chapter III treats the epidemiologic approach to reading disabilities in an admirable fashion. It is thorough, scientific, and points out the innumerable pitfalls that have limited the value of interpretation of previous studies. Once more, this is a chapter that those engaged in research of reading underachievement would do well to study; the excellent reviews of specific studies provide sufficient detail as to their strengths and weaknesses. The co-authors, Jane Schulman and Alan Leviton, treat the question of definition, the role of heredity, social class, prenatal, perinatal and postnatal factors, including malnutrition, and school performance. The roles of meningitis, encephalitis, congenital infections, and the recent inquiry into the role of lead exposure are nicely reviewed. Again, for readers studying the occurrence of dyslexia within their communities, I would recommend this chapter; within it are useful suggestions as to how one's investigation might be more profitable.

Chapter IV by Byron P. Rourke provides a neuropsychologic perspective to reading, spelling, and arithmetic disabilities. This chapter also is extremely well organized and presents the view of neuropsychologists and particularly the work of Rourke and his associates. The author sensibly reviews those studies which have treated level of performance as well as studies searching for pathognomic signs. He points out the necessity for investigators to be willing to treat qualitative differences as well as quantitative differences.

Finally, he approaches the topic of differential score studies and from this has evolved a subclassification of three types of learning-disabled students. Type 1 is characterized by well-developed visual-spatial and eye-hand coordination skills; average or near-average performance in measures of tactile-kinesthetic abilities, abstract reasoning, and nonverbal-consonant formation; near average performance on word definition; mildly impaired word blending; immediate memory for digits and store of general information; and mildly to severely impaired verbal fluency in sentence memory. Type 2 is characterized by average or near-average kinesthetic, psychomotor, visual-spatial constructional and word-definition abilities, and nonverbal or word problem-solving and abstract reasoning skills; borderline to mildly impaired immediate memory for digits and other "sequencing" skills, store of general information, sound blending, verbal fluency, and concept formation when substantial verbal coding is required and/or when no positive or negative feedback is provided; moderately to severely impaired finger recognition, immediate visual-spatial memory, and memory for sentences. Type 3 is characterized as average or near-average finger recognition (left hand), kinesthetic, visuo-spatial constructional, vocabulary and sound-blending abilities, and nonverbal concept formation within a context of immediate and positive or negative feedback; borderline to mildly impaired finger recognition (right hand), immediate memory for digits, eye-hand coordination under speeded conditions, store of general information, and nonverbal abstraction and the shifting of set without the benefit of positive and negative feedback; with mildly to moderately impaired verbal fluency, sentence memory, and immediate visual-spatial memory as well as moderately to severely impaired concept formation which involves substantial verbal coding.

Rourke also reviews his work with children underachieving in spelling and mathematics. He points out the necessity of making comparisons between groups of younger and older ages as the native skills and classroom demands will vary with age. Thus, a static approach to evaluation which does not take into consideration these factors is less apt to be rewarding. Rourke points out the need for greater specification of brain-related abilities of various subtypes of learning-disabled children across the 5-15 year age span. For those in the field of psychology, both theoretical and clinical, this is a chapter that should be read carefully.

Chapter V deals with brain-event-related potentials and their relationship to research and learning disabilities. There is some admixture of nomenclature between learning disability, reading retardation, MBD, and hyperkinesis. However, in the studies cited, it is clear what the authors have selected within their target population. The search for electroencephalographic concomitance to behavior began at the outset of the development of electroencephalography. The work of these authors suggests that although there is improvement in the quality of techniques, and that closer relationships between electroencephalogram and behavior are being established, we cannot yet make direct inferences from electroencephalograms to behavior. They do make the suggestion, however, that there is some evidence that "brain-event-related potentials of dyslexics differ from those of normals and that, within a group of dyslexics, such potentials of dyseidetics [to use Boder's terms] differ from those of dysphonetics."

For those in the field of remediation who incorporate tactile learning into their remedial techniques, the chapter by Helen Shaner Schevill will prove of great interest. She attempts to assess, in a structured way, the impact of such training with various ages and types of reading-impaired children. She describes differential forms of tactile stimulation, both passive and active, in the attempt to improve written language behavior. Although some of the suppositions and inferences made about the relationship between specific tasks and what actually is occurring in the central nervous system can be disputed, in my view this is the most detailed and carefully put-together attempt to prove the worth of a multisensory system of learning that incorporates tactile-kinesthetic cues in the remedial approach. The author concludes that the spatial factor is an important component in either facilitating or limiting tactile learning for the disabled child. Its effectiveness depends on individual differences in visual memory tactile training, and the nature of the stimulation.

As one's good sense would suggest, tactile letter decoding facility is not a unitary ability but requires competence in cross-modal spatial-verbal integration, visual imagery, verbal recall, figure-ground imagery, and ideomotor imagery. Utilizing a unique multiple sequential stimulus outline technique delivered to the palm, the tracing on the back of the hand, and the passive movement of the child's hand in tracing letters or combinations of letters, the author concludes that such a curriculum for the reading-disabled child should be encouraged. She suggests that a modified tactile curriculum, with highly structured tasks in verbal categorization of pairs of letters, might bring the tactile and verbal systems into closer interaction. Alternating the various tactile tasks with visual and auditory cues and classification tasks, she suggests, might assist in developing better association between symbol and sound. Doubt was raised regarding such technique for the child with poor memory skills, as well as children with other forms of deficits in visual-spatial processing. In essence, the work of the author confirms the empiric assertions of many teaching clinicians that such a multisensory technique is of profit to many reading-disabled children.

In his chapter on reading disabilities and cognitive disturbances, James R. Killen reviews the reading process and those behaviors which underlie it, indicating how specific cognitive ability assessments are important to the development of an appropriate educational plan. The assumption is that the majority of reading (written language) disabilities are processing disabilities, a point over which some in special education have taken issue. However, for those who espouse this view, and in the main I am one of them, the author makes a pertinent point which those in clinical education and clinical psychology should note. "Our evaluation methods must be consistent with the education strategies adopted for each child. If we employed a general evaluation method for a group of reading-disabled children with differences in cognitive dysfunctions, the results obtained may be more diagnostic of the learning problems than they will be evaluative of the learning program. Hence, individualization of all facets of the remediation program is essential to the education of dyslexic children."

Chapter VIII is entitled, "Reading Disabilities: Problems of Rule Acquisition and Linguistic Awareness." The authors, Doris J. Johnson and Pamela Evans Hook, have provided a masterful review of the relationship between the principles of language acquisition at higher and lower order levels to those children with specific disabilities in receptive and expressive written language. It is an eloquent review of the literature and helps to orient those in the practice of clinical remediation to greater sensitivity to the language process itself. The authors point out that oral language cues are directly related to the cuing, the systems, used in reading, and thus are important to include in the diagnosis of (language) learning-disabled children. They point out the importance of studying the child's ability to abstract and apply linguistic rules in novel situations. They correctly observe, I believe, that to provide the most beneficial instruction, it is helpful to observe the ways in which a child acquires new rules and principles. The sense is that remediation will need to provide ample opportunity for rule application so that language patterns will become more automatic.

Although the preceding chapters include information which would be of help to providing direct services, the final chapter, by John T. Guthrie and Mary Seifert, devotes itself particularly to the education of children with reading disabilities. The authors provide insight into the practical dilemma within which the educator engaged in practice finds him/herself. They criticize those who have assumed that visual perception of geometric design is equivalent to visual perception of written symbolic material. They also point out the limitations of many diagnostic instruments. The authors allude to the areas of reading skills and technique of training in which attempts are made at direct measurement of behavior to be taught with daily follow-up measurement. Individual analysis and experimental controls are necesary in determining whether any specific teaching activities influence the child's performance level. The authors point out that simple naming of a written set of symbols does not constitute the reading process, and they discuss the stages involved in reading comprehhension and the necessity of acquiring these fundamental cognitive processes.

The authors suggest that there is a difference between those who construe neurologic substrate as a probable factor in reading disability and those who stress factors of cognitive processing. However, the two are interrelated; the conclusion that those with some identified neurophysiologic or neuroanatomic difference that may contribute to reading underachievement are less amenable to remediation that those of a cognitive deficit (presumably unrelated to any specific brain activity deficit) need not be a valid conclusion. In contrast to some of the other contributors, these authors suggest that subtyping of underachieving readers may not have implications for differential instruction. They raise some basic clinical questions that relate to service to readers at the primary and intermediate level of reading instruction—questions that have yet to be answered. Four principles of instruction are suggested which include direct instruction toward deficient cognitive processes, provision of simultaneous instruction in as many cognitive processes as need improvement, integration of instruction on deficient components and the purpose of reading for pleasure or information, and lastly, a substantial time commitment to formal reading instruction. However, the specific suggestions are made on the basis of the experience and inference of the authors rather than hard scientific data.

Overall, this is a useful text that should be available in every special education library. It will be of value to all those interested in written language underachievement regardless of their primary discipline.

—Drake D. Duane, M.D.
Mayo Clinic
Rochester, Minnesota